

Full of Hot Air? Three Examinations of Climate Change in the  
American Political Information Environment

by

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Dissertation submitted in partial fulfillment of  
the requirements for the degree of Doctor  
of Philosophy in Environment  
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ABSTRACT

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## **Abstract**

Climate change is thought to be one of the most pressing environmental problems facing humanity. However, due in part to failures in political communication and how the issue has been historically defined in American politics, discussions of climate change remain gridlocked and polarized. In this dissertation, I explore how climate change has been historically constructed as a political issue, how conflicts between climate advocates and skeptics have been communicated, and what effects polarization has had on political communication, particularly on the communication of climate change to skeptical audiences. I use a variety of methodological tools to consider these questions, including evolutionary frame analysis, which uses textual data to show how issues are framed and constructed over time; Kullback-Leibler divergence content analysis, which allows for comparison of advocate and skeptical framing over time; and experimental framing methods to test how audiences react to and process different presentations of climate change. I identify six major portrayals of climate change from 1988 to 2012, but find that no single construction of the issue has dominated the public discourse defining the problem. In addition, the construction of climate change may be associated with changes in public political sentiment, such as greater pessimism about climate action when the electorate becomes more conservative. As the issue of climate change has become more polarized in American politics, one proposed causal pathway for the observed polarization is that advocate and skeptic framing of climate change

focuses on different facets of the issue and ignores rival arguments, a practice known as “talking past.” However, I find no evidence of increased talking past in 25 years of popular newsmedia reporting on the issue, suggesting both that talking past has not driven public polarization or that polarization is occurring in venues outside of the mainstream public discourse, such as blogs. To examine how polarization affects political communication on climate change, I test the cognitive processing of a variety of messages and sources that promote action against climate change among Republican individuals. Rather than identifying frames that are powerful enough to overcome polarization, I find that Republicans exhibit telltale signs of motivated skepticism on the issue, that is, they reject framing that runs counter to their party line and political identity. This result suggests that polarization constrains political communication on polarized issues, overshadowing traditional message and source effects of framing and increasing the difficulty communicators experience in reaching skeptical audiences.

## **Dedication**

To my parents, who have never wavered in their support.

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# 1. The Problem with Climate Change

Global climate change has been a persistent issue in American political discourse since at least the late 1980s. Introduced to the American public in a Senate Energy and Natural Resources Committee hearing in June of 1988, global warming – as the issue was then known – swept into the public consciousness amidst a sweltering heat wave affecting much of the country (Kolbert 2006). Immediately, the environmental issue acquired social and political cachet. Being an election year, politicians such as then-Vice President George H. W. Bush quickly incorporated this hot topic into their campaign platforms; Bush memorably promised to convene a global conference on the environment personally overseen by his office if elected to the presidency, vowing to “fight the greenhouse effect with the White House effect” (*New York Times* 1990).

This short period may have marked the high-water point for political discourse on taking action against climate change for the first decade and a half of its political life. After the election, no such committee was convened, and the country seemed to move on without comment as global annual temperatures crept steadily upwards (Ungar 1992). At the end of 2015, nearly three decades later, no national legislation governing climate change mitigation or adaptation had been passed in the United States.

American climate change politics has been marked by dispute, controversy, and polarization at both elite and public levels (Dunlap and McCright 2011, McCright and Dunlap 2011a). Attitudes and opinions on climate change have diverged dramatically

over the past two decades and remain sharply divided (McCright and Dunlap 2011a), with some calling climate change an “urgent and growing threat...beyond dispute” (Obama 2015) and others “the greatest hoax ever perpetrated on the American people” (Inhofe 2003). At the public level, climate change has become remarkably polarized yet remains an exceedingly non-salient issue overall; the partisan gap between liberal Democrats and conservative Republicans on whether they believe climate change is a serious issue is a staggering 62 percentage points, however only 38 percent of Americans think of climate change should be a top priority for the president and Congress (Pew Research Center 2015a, 2015b). In short, political communication on climate change has become more strained while the need for resolution has become more pressing. This dissertation explores the acrimony over climate change seen from 1988 to 2014, both how it came to be politically divisive and how polarization constrains political communication.

I examine climate change as a polarized issue in American politics, particularly how various forms of communication have both shaped and been shaped by the politicization and polarization of climate change. Three questions are asked here: 1) How has climate change been historically constructed as an issue in American politics, particularly in public discourse? 2) How have conflicts over climate change policy been historically portrayed in American public discourse? 3) Conversely, how has polarization affected communication about this issue? By answering these questions, I

first construct a comprehensive account of how climate change has been constructed and understood as an issue in American politics. I then explore the connection between the historical communication of climate change and the increasing political polarization on the issue, particularly in public opinion. From there, I survey how polarization impacts political communication by limiting the potential for engagement with climate skeptics.

### ***1.1 Environmental Issues in an Economic World***

Climate change has become a strikingly polarized and politically loaded issue over the past three decades. To better understand the evolution of this controversy, it is necessary to explore the history of environmental issues in 20<sup>th</sup> century American politics. According to cultural historian Frederick Buell (2003), the American conservative movement had long used the Soviets as anti-US bogeymen during the Cold War, conflating communist ideology with anti-Americanism while simultaneously holding up political conservatives in the vein of Ronald Reagan as champions of authentic American values. However, with the rise of perestroika in the late 1980s and warming relations across the Bering Strait, Buell claims that conservatives searched for a new enemy to rally against, finding one in the burgeoning American environmental movement. Environmentalism – seen by the right as anti-capitalist, counter-cultural, and anti-American – became easy to scorn. In essence, conservatives were able to replace the “Red Menace” with a “Green Menace” and parlay environmentalism into a great threat



to the American way of life, particularly to American industry (Buell 2003). In essence, environmental issues became bound with economic issues in political discourse.

The connection between environmental issues and economic concerns has had an outsized influence on how climate change is perceived and discussed in American politics. In essence, environmental politics are viewed through the lens of economic thought, and environmental issues are made to appear as economic issues. This environment versus economy dichotomy has dominated public opinion about the American environmental movement since at least the 1980s, when concerns about under-regulated natural resource exploitation and industrial pollution put the environment squarely at loggerheads with the forces of free-market capitalism (Buell 2003, Tarrow 2011, Pakulski 1991). As Judith Layzer (2012) documents, perhaps the most powerful tool used by the American conservative anti-environmental movement is not direct attacks on environmentalism, but rather “[the dissemination of] a compelling antiregulatory storyline to counter the environmentalist narrative” (p. 4). This argument has “imparted legitimacy to a new antiregulatory rhetoric, one that emphasizes distrust of the federal bureaucracy, admiration for unfettered private property rights and markets, skepticism about science, and disdain for environmental advocates” (Layzer 2012, p. 4). Environmentalism represented a zero-sum game with regards to the economy: environmental protection means restrictive regulations, market restrictions, and limits to economic growth.

The conflation of environment and economy is not new, and interestingly, both sides in the climate change debate – that is, advocates and skeptics of climate policy alike – have historically employed economic arguments to support their respective positions. For instance, sociologist Maarten Hajer (1995, p. 31) characterizes mainstream environmentalism as “[using] the language of business and [conceptualizing] environmental pollution as a matter of inefficiency.” Skeptics argue that governmental action against climate change is economically risky, hinders economic growth, and restricts free enterprise (Antonio and Brulle 2011). These arguments are in line with research suggesting that the public is particularly hesitant to change the status quo, i.e., a lack of climate action (Eidelman et al 2009). Climate policy advocates, meanwhile, argue in favor of energy independence, job creation, and long-term gains from a greener economy – emphasizing a win-win paradigm (Engel and Kammen 2009).

The environment-economy relationship and its rhetoric have become institutionalized in American environmental politics. Other framings of the environment and climate change exist – for example, some academic attention has been paid to moral frames (e.g., Markowitz and Shariff 2012) and public health frames (e.g., Myers et al. 2012). However, economic framings of the issue appear fundamental to how the issue is understood. For instance, in the September 2015 Republican presidential debate, candidates Marco Rubio, Chris Christie, and others shouted over each other in their haste to brand climate change policy as destructive to economic growth, jobs, and free

markets. They did so despite a prompt about the pursuit of climate action on the grounds of scientific certainty (Wolfgang 2015). Moreover, many “alternate” framings of the issue may easily be viewed through an economic lens, for instance, through economic valuations of public health (Akerlof et al. 2010). Consequently, climate change has become an issue that has been historically communicated along economic lines and constructed as an economic concern as much as it is an environmental one.

## **1.2 Communication Matters**

Political issues are shaped by how they are communicated and understood. As Bruno Latour (1987) explains, concepts – and to him, even scientific facts – are codified through the telling and retelling of consistent claims until the concept’s definition has been accepted by some audience (or society at large) as legitimate. In other words, issues matter politically only in how they are perceived and explained. In political science, the construction and communication of issues is termed “framing.” As Chong and Druckman (2007) define the term, framing “refers to the process by which people develop a particular conceptualization of an issue or reorient their thinking about an issue” (p. 104). The units of research in framing are frames, or messages that strategically emphasize certain facets of an issue and ignore others in order to influence individual and public perceptions of that issue (Chong and Druckman 2007). Cognitive linguist George Lakoff (2008) notes that frames contain cues or sets of cues that speak to their audience’s moral values, cultural values, and identities. Thus, individuals become

attuned to the frames with the most personally salient cues, and mental associations of frames and values deepen with repeated exposure to the same cues.

Framing works on two levels – through political communication and through political cognition. In a helpful framework, Druckman (2001) labels these two phenomena as “frames in communication” and “frames in thought.” Frames in communication refer to the more conventional sense of framing – a source communicating information (perhaps selectively) through an auditory, visual, or textual medium. These effects can be further broken down into message effects and source effects. Message effects pertain to the content of the framing – which elements of an issue are emphasized, de-emphasized, or made most accessible for the message receiver’s consumption (Chong and Druckman 2007). For instance, research has shown that individuals are generally more receptive to messages referencing issues owned by the party they personally identify with than to opposition-owned messages (Sides 2006, Cohen 2003). Source effects, meanwhile, relate to perceptions of the deliverer of the frame, with source credibility linked to perceived knowledge, trustworthiness, and whether the messenger shares the perspectives or characteristics of the intended audience (Lupia and McCubbins 1998, Druckman and Lupia 2000, Cohen 2003). Frames in communication attempt to set the stage for and boundaries of an issue’s political definition. For instance, suppose that mass incarceration was discussed exclusively in terms of economic drain; arguments referencing civil rights might never enter the

conversation given the lack of discursive representation, regardless of how obvious the connection.

Frames in thought, meanwhile, refer to how individuals receive, process, and interpret information. In other words, frames in thought cover how frames, once communicated to an individual, are understood by that individual. This field of study includes older literatures on heuristics (e.g., Kahneman and Tversky 1979) and cognitive dissonance (Festinger 1957), insights from behavioral studies (e.g., Zaller 1992, Lupia 1994), as well as more recent research on topics such as motivated reasoning – how personal identity cues influence information processing (e.g., Lodge and Taber 2013) – and affective models of how emotional responses mediate cognition (Marcus et al. 2000). Frames in thought are important because human beings are not cold, calculating machines, mindlessly receiving informational inputs. Rather, they are active information processors who – consciously and unconsciously – filter stimuli through cognitive mechanisms such as biases and schemas. As a result, an individual may process a frame very differently from how the original communicator intended the frame to be understood. For example, a frame arguing that marijuana should be legalized on the basis of tax revenues might backfire on an individual who is disgusted with drug use and sees the frame as an argument for profiting from vice.

### **1.3 Frames versus Frames**

Another major consideration of framing is that political communication does not exist in a vacuum. Political discourse is often contentious, with multiple frames competing for rhetorical dominance; framers struggle to make their understanding of an issue the common understanding. This competitive dynamic has been noted by a wide range of social science scholars, with the fundamental premise that contentious political rhetoric from rival actors creates a contested space of understanding. In other words, these rival frames help make up the arena of information and communication, or the information environment, encompassing some political issue, with each framing coalition “[struggling] for discursive hegemony...[trying] to secure support for their definition of reality” (Hajer 1995, p. 59). These actors then struggle to control that issue’s information environment and shape it to reflect the frames that are most advantageous to their position. Actors may attempt to dominate framing by creating more favorable contexts for themselves by selecting advantageous venues for communication (Pralle 2003), shifting attention towards their preferred arguments (Jones and Baumgartner 2005), taking advantage of focusing events (Jones 1994), or counter-framing and arguing effectively against opponents (Chong and Druckman 2012). This is a dynamic system: actors may change, strategies may change, focusing events can arise unpredictably, and frames themselves may evolve over time.

Just as frames compete in the wider information environment, they compete in an individual's political cognition. It has long been known that most Americans are not very interested in politics (Campbell et al. 1960). In lieu of deliberative thought that generates political opinions, individuals may keep multiple contradictory frames in mind and then select whichever is the most accessible in memory at the moment (Zaller 1992). However, this sort of low-effort political cognition may still produce an individual's preferred political outcomes (e.g., Lupia 1994). Individuals who are more politically inclined may complicate simplistic models of political cognition via motivated reasoning, the notion that strongly held identity claims can create motivations that influence information processing (Kunda 1990). These motivations may come in two varieties. Accuracy-based motivations mean that the individual is particularly interested in finding the objective truth about some issue, whereas directional motivations indicate that the individual is invested in reaching some predetermined conclusion (Kunda 1990). In the case of directionally motivated individuals, information may be preferentially selected or processed to confirm their preferences while conflicting information may be discarded outright (Taber and Lodge 2006). Taken together, these studies suggest that political communication on particularly contentious issues like climate change provides rich research material to determine how individuals engage with politics and political issues.

## **1.4 Structure of the Dissertation**

The purpose of this dissertation is to better understand the processes of political communication and issue polarization in American climate change politics using a mixture of analytical methods to confront the subject from a variety of perspectives. It is my hope that this will provide a more holistic investigation of the issue and yield insights into what makes climate change such a difficult issue to communicate and address.

Chapter 2 of the dissertation examines how climate change has historically been portrayed and communicated in American politics. Drawing from the literature on emphasis framing (e.g., Chong and Druckman 2007), this chapter describes how the issue has been framed and how individual frames combine to form wider storylines that define the issue in public discourse. Drawing on framing and agenda-setting theory, I also examine the process by which the rhetorical prominence of climate change storylines arises and fades. I accomplish this task using 25 years of newspaper articles from the *New York Times* spanning from 1988 to 2012 and coding articles for their use of environment-economy frames, or arguments that situate environmental issues, such as climate change, in the domain of economic concerns. For instance, these frames include claims relating climate change to economic growth or job destruction. Given that environment-economy frames are central to how climate change is discussed in American politics, the storylines generated by my method should accurately reflect the



historical construction of climate change in public discourse. I identify six major storylines over the period 1988-2012, which rise and fall in prominence, perhaps according to focusing events such as electoral change or extreme weather events. These results show that the historical construction of climate change has been fluid, with no single storyline effectively defining the issue.

Chapter 3 uses the same newspaper content dataset to explore how historical media framing of climate change relates to ongoing polarization of public opinion. Specifically, I test Andrew Hoffman's (2011) communication hypothesis of polarization by investigating the claim that climate change has become politically polarized as a result of a historical trend in communication wherein advocates and skeptics of climate action systematically ignore their opponents' arguments. This "talking past" hypothesis from negotiation theory provides a compelling explanation for how political communication impacts issue polarization, but it had not previously been empirically researched at length. I model over-time divergence between advocate and skeptic frames and find, contrary to the talking past hypothesis of polarization, no significant increase in talking past. This result suggests that divergence in framing has not increased in popular newsmedia, as typified by the *Times*; thus, talking past in popular newsmedia communication on climate change may not cause public polarization on the issue.

Conversely, Chapter 4 asks, “how does widespread political polarization on climate change affect political communication and cognition?” While a large body of public opinion research has studied climate change and framing, few studies have specifically focused on how polarization impacts how individuals process information on the issue. Of those, fewer still include cognitive measures to understand which psychological mechanisms, such as motivated reasoning, are at play. My study draws on a novel survey experiment of American Republicans to test how partisan identity affects individual perceptions of message and source framing effects. I find that Republicans respond negatively to pro-action framing, exhibiting changes on multiple measures of climate change attitudes that are consistent with motivated reasoning. These results suggest that political communication may be severely constrained on polarized issues such as climate change, triggering and increasing the effects of motivated reasoning.

Chapter 5 concludes with a discussion of the implications of these three studies for the fields of political communication and environmental politics. I consider how American climate change politics may develop if polarization is left unchecked and highlight the necessity of further research in certain areas. These include examining the effects of narrowcast media on the polarization characterizing and the information environment surrounding an issue.

## **2. Hot Takes: Historical Storylines of Climate Change in American Public Discourse**

The history of climate change in 21<sup>st</sup> century American politics is characterized by conflict. For decades, the issue has been split along fierce lines of contention between advocates of society taking action against warming and skeptics of such notions or, for that matter, of the existence of climate change. This acrimonious setting has evolved to the point that multiple historical accounts of American climate change politics refer to it as “the Climate War” (e.g., Pooley 2010, Mann 2012). While climate skeptics have long equivocated on the legitimacy of climate change as a political issue and on the government’s responsibility to act on it, climate advocates have become increasingly assured that climate change is occurring; is caused by human behavior; and will have massive negative implications politically, ecologically, and economically if left untreated (McCright and Dunlap 2010). It is on this last dimension – the economic considerations of climate change – that I focus.

In this chapter, I will provide a comprehensive examination of how climate change has been historically portrayed in economic terms in American public discourse. Using 25 years of newspaper data from the *New York Times*, I trace popular depictions of climate change and scrutinize how these depictions have shifted over time, as well as explore which events may have precipitated these changes in societal and political understanding.

## **2.1 Background and Theory**

### **2.1.1 Framing effects**

Framing is the process by which issues are constructed and disseminated in political communication (Chong and Druckman 2007). However, it is important to be careful when discussing framing given the term's convoluted and decentralized use in social science research. First, the difference between equivalency frames and emphasis frames must be clarified. Equivalency frames refer to statements that are presented differently – but in a logically identical manner – that produce heterogeneous effects on individuals (e.g., Kahneman and Tversky 1979). For instance, an individual may be more supportive of a medicine that promises a 90% cure rate than one disclosing a 10% ineffectiveness rate, even though these alternatives are mathematically equivalent. Equivalency frames are often studied in behavioral economics, particularly in the fields of prospect theory and choice architecture, which study individual decision-making (e.g., Kahneman and Tversky 1986).

Emphasis frames, however, take advantage of the complexity and multidimensionality of an issue by selectively highlighting and providing positive or negative valence to aspects of that issue (Chong and Druckman 2007). Emphasis framing effects result from a number of cognitive heuristics, including availability, accessibility, and applicability (Price and Tewksbury 1997, Chong and Druckman 2007). In short, they work by making the selected facets of an issue present in an individual's memory

(availability), more likely to be brought up when evaluating that issue (accessibility), and relevant to the issue (applicability). For example, approval of a hate group organizing in one's community has been shown to vary depending on whether the scenario is framed as a matter of free speech – with the connotation that free speech is good – or as a threat to public safety, which is bad (Nelson et al. 1997). From a schematic perspective, an individual's attitudes toward some issue may be thought of as the overall sum of their evaluations of all the dimensions of the issue (positive or negative) weighted by the salience of each dimension. In this conceptual model, framing adjusts the weights – giving primacy to the dimensions emphasized in the frame and decreasing the importance of the dimensions that are ignored (Nelson and Oxley 1999).<sup>1</sup>

In this dissertation, I use the terms “frame” and “argument” interchangeably with the understanding that a frame advances a political position on an issue via highlighting one particular facet of that issue. That is, frames/arguments focus on single dimensions of an issue, such as equity, cost, or risk, with a prescriptive implication that some stance on the issue is superior or inferior to others.

### **2.1.2 Framing over time**

Frames are not static phenomena; they change over time and in relation to other frames that are both complementary and oppositional. In high-profile political issues

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<sup>1</sup> While this is a useful conceptual model, further research has suggested that framing can also affect evaluations (Slothuus 2008; Leeper and Slothuus 2015, unpublished; Druckman and Nelson 2003).

like climate change, frames compete in a contentious environment (Hajer 1995).

Counter-frames, or oppositional arguments, emerge to challenge dominant frames in accordance with counter-movements reacting against dominant social movements (Chong and Druckman 2012, Rohlinger 2002, Tarrow 2011). Counter-frames often use the same discursive elements, or arguing points, as the dominant frame in order to confuse or subvert an established, rival causal argument (Hajer 1995).

Reactionary cycles occur as counter-frames are themselves refuted, inducing frame change and variation over time (Baumgartner et al. 2008). For instance, an initial frame that portrays regulatory action against climate change as economically harmful may be countered by a frame arguing that failure to act would be even more economically disastrous for the US, which could in turn be countered by a frame suggesting that any warming effects may actually be an economic boon in terms of increasing viable land area for agriculture.

Frames also change over time due to external shocks, such as key focusing events, which can shift public and media attention toward new issues due to a change in context (Baumgartner et al. 2008, Jones and Baumgartner 2005, Cobb and Elder 1983). Focusing events are dramatic, relatively-uncommon events that are publicly understood to have acute and/or potentially harmful impacts on society or communities of interest (Kingdon 1995). For instance, focusing events in the environmental world include earthquakes, oil spills, and nuclear power accidents (Birkland 1998). Political focusing

events include scandals, political crises, and elections in democratic societies (Walker and Waterman 2008). Given their potential society-changing nature, focusing events may facilitate agenda-setting by redirecting elite, media, and public attention towards a particular story or crisis that had previously been ignored or unconsidered, resulting in a punctuated equilibrium system of political attention and policy change (Baumgartner and Jones 1993).

In essence, strong external influences may dramatically reframe the public understanding of a political issue by highlighting a set of dimensions that are suddenly more salient as a result of the event and that draw public attention. One manifestation of this dynamic would be the addition of new information that dramatically alters previous perceptions of an issue. For example, Armstrong (2003) describes how medical researchers in the 1970s were able to draw public and political attention to a purported link between alcohol consumption during pregnancy and birth defects, leading to widespread demonization of drinking while pregnant. In this case, the new information came in the form of medical research on fetal alcohol syndrome, then a novel concept.

In the case of climate change, the newsmedia has a tendency to cover the issue in terms of crisis and drama (Bennett 2002). Focusing events, by definition, push an issue “above the noise threshold of other issues” (Liu et al. 2009, p. 406) and provide an opportunity for newsmedia to use a dramatic lens in its coverage (Kingdon 1995, Cobb and Elder 1983). As a result, focusing events are likely to influence how the issue of

climate change is framed in media due to their disruptive and attention-grabbing nature. For climate-related focusing events based on a natural crisis such as a hurricane or tsunami, framing may shift to the “politics of disaster” and examine the issue in light of preparedness or political consequences (Birkland 1998). For climate-related focusing events that are political in nature, such as an election, media framing may take on themes of lauding those seen as political winners and deriding political losers (Jamieson and Waldman 2004).

### **2.1.3 Frames and communication**

While individual instances of framing may be powerful, these effects are largely temporary (Chong and Druckman 2007, Lecheler and de Vreese 2011). The lasting impact of framing occurs when frames are repeatedly applied to issues. Repetition is important both on the communicator’s end to saturate the information environment with their arguments (Baumgartner et al. 2008) and on the individual recipient’s end in terms of increasing accessibility (Moons et al. 2009, Entman 1989). In this way, frames become institutionalized in discourse by continually defining how issues are understood.

Frames are also potentiated when used in tandem with other frames. The product of individual frames combining to form something greater takes on many names. Baumgartner et al. (2008) simply call them “frames,” with the key distinction that individual emphasis frames are considered “arguments” in their typology;



combinations of frames that change over time are called “evolutionary frames.” Others (e.g., Mayer 2014) refer to them as “narratives,” with the added feature that narratives include some sort of overarching plotline. For example, in the civil rights movement, Black leaders cast their movement as victims locked in righteous opposition against oppressive Southern White authorities. Hajer (1995) uses different terms: individual frames – or “discourses” – are blended together into more widely encompassing, more powerful combinations he calls “storylines.” According to Hajer, the information environment surrounding an issue contains opposing political actors who engage in a struggle for discursive dominance wherein they advance competing storylines in an effort to “impose their views of reality on others” (Hajer 1995, p. 47). In this chapter, I use Hajer’s term, storyline, to refer to these collections of linked frames.

In terms of how frames and storylines make their way into public discourse, the newsmedia hold a privileged position as both trusted arbiters and mass distributors of information. The mainstream newsmedia exert powerful agenda-setting and framing effects given its presumed credibility (Iyengar and Kinder 1987, Scheufele and Tewksbury 2007). Reliance on media frames as a shortcut through which to understand political issues intensifies with the complexity of the issue (Lau and Redlawsk 2001). For the public, the newsmedia are also often the most accessible source of political information and elite cues (from actors such as policymakers and other social leaders), which provide vital stimuli for individuals who engage in politics on a very basic and

disinterested level (Entman 2003, Lupia and McCubbins 1998). In other words, as issues become more complex and individuals know less about the specifics of that issue, they are more likely to turn to trusted sources of information, like the newsmedia, in order to educate themselves and form their understanding of the issue.

To illustrate how frame repetition, storyline construction, and media effects combine to effect political change, Baumgartner et al. (2008) map out the evolution of the death penalty in American public discourse. Using 45 years of *New York Times* coverage on the issue, they find that the death penalty has been historically framed many ways but that, since the mid-1990s, discussion of the issue has been dominated by the “innocence” storyline, the general argument that capital punishment is unacceptable given that the current system may unjustly execute innocent persons. Baumgartner et al. trace the rise of this storyline, which is composed of 16 individual frames, to then-recent cases of DNA profiling exonerating prisoners on death row. They conclude that this storyline, whose weighty presence in public discourse extends to the end of their dataset, has effectively redefined the death penalty in American politics to follow this “innocence” construction.

Most Americans first learned about the issue of climate change through the media and were thus even more reliant on those initial cues to form early opinions (Smith and Leiserowitz 2012). Consequently, the public may lean heavily on news coverage to process information on climate change, an issue characterized by

considerable technical difficulty and multidimensionality. Newsmedia reporting on climate change therefore makes an excellent case for understanding how an issue is publicly understood and discussed.

In this chapter, I examine how climate change has been portrayed in American public discourse in order to describe how the issue has evolved in American politics. In particular, I investigate how climate change has been constructed into various storylines over the 1988-2012 period, which storylines have dominated public discourse on the issue, and whether any storylines dominate discourse through the end of the dataset as with Baumgartner et al.'s (2008) innocence finding. Once I have identified the major storylines in climate change, I consider which focusing events may have prompted transitions between storylines and/or boosted the profiles of particular storylines.

## **2.2 Methods**

### **2.2.1 Data**

I created a novel dataset by coding *New York Times* articles addressing climate change from 1988 to 2012. The *New York Times* was selected due to its recognized status as the country's "newspaper of record," cited for the highest-quality and most accurate reporting of American affairs (Martin and Hansen 1998, Winter and Eyal 1981). As Sigelman and Buell (2004) put it, information in the *Times* is notable for the very fact of its inclusion; such information is thus considered to have passed "a demanding test of

its importance” and been deemed worthy of documentation in the public discourse (p. 654).

Consequently, many analyses of frames in media use the *New York Times* as a primary data source and meta-analyses find that the coverage in the *Times* is largely representative of other American newspapers on a variety of topics ranging from capital punishment to climate change (e.g., Baumgartner et al. 2008, Liu et al. 2009). Indeed, Liu et al. (2009) find no significant differences between how the *New York Times* covers climate change compared to other mainstream news sources, namely the *Los Angeles Times* and *Chicago Tribune*. *New York Times* coverage of the news has been found to closely parallel national television news coverage (Golan 2006, Atkinson et al. 2014). The *Times* has also been cited for its role in agenda setting within mainstream American news coverage, thereby dictating the focus and framing of the rest of the newsmedia for both elite news media as well as local television and print news operations (Wanta and Hu 1994, Kioussis 2004, Protess and McCombs 1991). This is not to say that there are no differences between the *New York Times* and other major newspapers in terms of news coverage or editorial slant. However, all things considered, the *New York Times* can be seen as the best single source for representing mainstream American news coverage.

Articles were drawn from the Lexis-Nexis online periodical database using a “major mentions” search function with start and end dates of 1/1/1988 and 12/31/2012, respectively. I chose 1988 as my starting point because this is the year climate change

made a splash in American politics; in a context of severe heat waves in the Midwest and East Coast and a Senate committee hearing on climate change, the issue was incorporated into political platforms during that year's presidential election (Kolbert 2006). The major mentions function limits the search to articles that include the terms "global warming" or "climate change" in the headline, lead paragraph, or indexing tags (Liu et al. 2009). This dataset includes all types of articles with these major mentions, including news articles, editorials, opinion pieces, features, and published letters to the editor. The extension of examined sources beyond news articles is justified given that I am attempting to study all occurrences of climate change frames in newsmedia. Thus, it makes little sense to distinguish frames used in a news story from those used in an editorial piece. Similar projects, such as Baumgartner et al. (2008), include these non-news articles as well. In all, I identified 9899 articles using this method. The specific search string is provided in Appendix A.

I then randomly sampled 30 articles from each year between 1988 and 2012 in order to create a dataset of annually representative news articles. I used the random sequence generator from Random.org, which uses atmospheric noise to generate high-quality random numbers, for randomization. I then reviewed each article in a year's sequence in order of randomization until I identified 30 articles that include at least one argument portraying climate change in economic terms so as to fit my environment-economy frame inclusion criterion. To be clear, articles were not coded for frames at this

point, just given a brief review to check that at least one environment-economy frames was present in sampled articles. While efficient, this procedure raises the possibility of false-negative error – perhaps articles including an environment-economy frame that was not spotted were erroneously excluded from the sample. However, this procedure eliminates false-positive error as all articles sampled include at least one environment-economy frame. In 1994, only 24 articles featured an environment-economy frame (of the 68 retrieved from Lexis-Nexis), producing a total sample of 744 articles.

### **2.2.2 Coding**

The 744 articles were then coded for environment-economy frames. I developed a typology of 13 base codes covering an exhaustive array of economically relevant framings ranging from explicit discussion of costs to more general discussion of industry interests and socioeconomic uncertainties. I focus on environment-economy frames given that they have had an outsized influence on how climate change is discussed and understood in American climate change politics (see section 1.1). In particular, the omission of other types of frames, such as those that focus on climate change as a scientific issue, is discussed in the Results and Discussion section of this chapter.

I derived these frames from a review of the climate politics literature and a pilot study I conducted of environment-economic frames in *New York Times* climate change reporting for the year 2002. This process was done in steps. I used the environment-economy frames from my 2002 study codebook, which I developed in the process of

reading 341 *New York Times* articles on climate change and noting arguments that situated climate change in economic terms. Then I combed the climate change communication literature to identify arguments on climate action with some economic dimension; these texts included books focused on historical framing of climate change (e.g., Buell 2003, Layzer 2012, Pooley 2010). Finally, I consolidated these two lists and cleaned them for double entries and ease of coding. This final list contained the 13 base codes used for this analysis.

Following Baumgartner et al. (2008), each base code was then split into a dyad according to valence: arguments were either in favor of governmental action against climate change (pro-action) or opposed to such action (anti-action). This process yielded 26 total codes, 13 pro-action and 13 anti-action. The coding for frames is described below and summarized in Table 1.

**Table 1: Summary of environment-economy frames.**

<b>Code</b>	<b>Anti-Climate Action Frames</b>	<b>Pro-Climate Action Frames</b>
<b>Development</b>	Action would harm future economic development	Action would support future economic development
<b>Cost</b>	Current action to mitigate climate change is too expensive	Current inaction to mitigate climate change will increase costs later (or current costs worth it)
<b>Jobs</b>	Action would cost jobs	Action would create jobs
<b>Efficiency</b>	Energy efficiency (including fuel efficiency) is not an important part of climate action	Energy efficiency (including fuel efficiency) is an important part of climate action
<b>Regulation</b>	Government regulation is a poor (or unnecessary) tool for climate action	Government regulation is a good (or necessary) tool for climate action
<b>Carbon pricing</b>	Carbon pricing is an ineffective policy for climate action	Carbon pricing is an effective policy for climate action
<b>Fossil fuel industry</b>	Action is against fossil fuel industry interests	Action would benefit fossil fuel industry interests
<b>Green industry</b>	Action is against green industry interests	Action would benefit green industry interests
<b>Other industry</b>	Action is against other (tourism, agriculture, etc.) industry interests	Action would benefit industry interests
<b>Risk</b>	Action now would be too uncertain or risky	Inaction now would be too uncertain or risky (precautionary)/Urgent action required
<b>Energy independence</b>	Action would not increase energy independence	Action would increase energy independence
<b>Equity</b>	Action would not increase equity (including North-South divide, intergenerational equity)	Action would increase equity
<b>National interest</b>	Action would be against the national interest ( <i>e.g., the US would be at a competitive disadvantage</i> )	Action would be in line with the national interest ( <i>e.g., the US would be at a competitive advantage</i> )

The articles were coded by hand using NVivo software, which allows for textual analysis of large quantities of qualitative data (Bazely and Jackson 2013). Each article was coded at any particular environment-economic frame if it contained one or more instances of such an argument. In other words, a frame for each article was simply



coded 1 for present or 0 for not present, and multiple instances of a particular frame were not recorded as such in the dataset. However, one article may be coded multiple times if it contained different environment-economy frames. For example, the excerpt “[a]s attorney general, Mr. Spitzer filed suits against many power plant companies to force them to reduce smokestack emissions. His new environmental team will complete the drafting of regulations carrying out the Regional Greenhouse Gas Initiative, a multistate pact to reduce pollution using market incentives and the auctioning of pollution credits” (DePalma and Perez-Pena 2007) was coded for both *pro-regulation* and *pro-carbon pricing* frames. However, further instances of either frame in the same article were not counted.

The first six frames center on ideas of economic structure and health. *Development* frames concern projections of future economic growth, usually in the context of a national or regional economy. *Anti-development* frames are those that claim climate action will weaken or stymie economic growth, whereas *pro-development* frames argue that action will have no deleterious effects on growth or may yield positive outcomes. *Anti-efficiency* arguments claim that increased energy efficiency, including fuel efficiency, is not an important aspect of effective climate action; *pro-efficiency* frames say that it is. I split industry interests into those of *fossil fuel-related industry*, which includes energy companies, automakers, and utilities; *green industry* with alternative energy

concerns; and *other industry*, a catch-all that mostly captures the interests of the agricultural and tourism sectors.

The remaining four frames speak to more intangible or idealistic aspects of the environment-economy relationship. The *anti-risk* code captures the argument that taking immediate governmental action against climate change is too risky or uncertain given current knowledge. *Pro-risk* frames argue the opposite – that putting off action into the future is too risky or that urgent action is needed to reduce uncertainties. *Equity* frames speak to how governmental action against climate change would increase or decrease equity among individuals, regions, and nations. Finally, the *national interests* frame serves as a category for idealistic notions of America’s place in the world (e.g., concerning its economic competitiveness or status as a world leader) and general threats against the country (e.g., mentions of impending sea level rise or spreading disease without identifying specific costs, risks, or impacts on industry interests). *Pro-national interests* frames argue in favor of climate action, and *anti-national interests* frames argue against such action.

While I coded all 744 articles myself, I checked for coding validity by enlisting two colleagues unconnected with the project to individually code a random sample of 25 articles using my 26-code scheme. The Krippendorff’s  $\alpha$  for this three-way intercoder agreement was 0.68. Given that Krippendorff’s  $\alpha$  is a rigorous but extremely conservative index for intercoder agreement and that the three-way test punishes

incongruent coding more than a two-way test, I find the coding and resulting dataset to be acceptable at this coefficient level (Schaer 2012, Lombard et al. 2010).

### **2.2.3 Analysis**

The data were analyzed using evolutionary factor analysis, a technique for deriving latent storylines from textual data. Using the procedure laid out in Baumgartner et al. (2008), coded articles were grouped by their year of publication and sums were calculated for every frame in each year. These years were then arranged into incremental five-year windows (e.g., a window lasting from 1994 to 1998 and the next from 1995 to 1999) and sums calculated for the frames in each window. Each window was then put through principal component factor analysis, which searches for shared variation among a set of variables. Variables that co-vary are said to share an underlying factor. In substantive terms, this factor analysis discovers which frames appear to rise and fall in tandem over a given period, with each set of kindred frames representing a possible storyline.

Frames are assigned to a factor if they load with an eigenvalue of 0.85 or higher, denoting high commonality with the other frames in that factor. From there, storylines are those factors with a shared set of common frames that persist over multiple five-year windows. Specifically, for a frame to be considered part of a storyline, it must be included in a factor that is present in at least two of three moving windows. For instance, if a factor comprised of *anti-cost*, *anti-development*, and *pro-jobs* frames is found

in the five-year windows for 1993-1997, 1994-1998, and 1996-2000 but not for 1995-1999, these frames would be counted as a storyline lasting from 1995 to 1998, the mid-point years of the first and last five-year windows, respectively. Storylines begin when some window – or more accurately, at least two of three contiguous windows – contains a set of frames loading on the same factor. Storylines end when that factor is no longer apparent in the data.

Some factors may be composed of solely pro-action or anti-action frames, with each individual frame complementing the others to form a more cohesive storyline. For instance, a storyline made up of *pro-development* and *pro-equity* frames might claim not only that climate action will strengthen economic growth but also that such growth would be more equitable than otherwise. Pro-climate action and anti-action frames may also share a factor. This makes intuitive sense – increased media attention to *pro-cost* arguments may also increase attention to *anti-cost* arguments, as that is the direct rebuttal frame. As another example, a factor combining *pro-green industry* and *anti-fossil fuel industry* frames might produce a storyline that climate action will be a boon for the renewable energy industry at the expense of the petroleum industry. Consequently, storylines may be comprised of any combination of frames and a storyline's content is determined by which frames are involved and how they are used together.

To compare the relative strength of storylines, I use Baumgartner et al.'s (2008) notions of salience, resonance, and persistence. These, they write, are the “three key

components of a successful frame” (p. 138). Salience refers to how often a storyline is used in the data, resonance to how many component frames compose a storyline, and persistence to how long a storyline lasts. These concepts are measured by attention and weighted attention. Attention is measured by the total number of articles including at least one of the component frames of a storyline over the duration of that storyline. For instance, suppose a storyline is composed of *anti-jobs* and *pro-cost* frames running from 2004 to 2006. Over this span, if there are 24 instances of the *anti-jobs* frame and 17 of *pro-cost*, the attention given to that storyline is 41 instances. Weighted attention is attention multiplied by the respective factor loading for each frame in storyline’s existence; that is, weighted attention is the overall sum of the number of instances each frame is used in a storyline weighted by how closely each frame relates to the storyline. The higher a storyline’s attention and weighted attention scores, the more salient, resonant, and persistent the storyline.

## **2.3 Results and Discussion**

### **2.3.1 Distribution of frames**

Over the period from 1988 to 2012, there are nearly twice as many sampled pro-action frames (2197) as anti-action frames (1157). This may be due to the reactive nature of climate skepticism (McCright and Dunlap 2003). Many mainstream news stories and commentaries on climate change seem to center around the various risks and costs associated with inaction – such as damage that may be incurred from unabated sea level

rise – with skeptical frames included as responses to these ideas. Fewer articles are written around anti-action frames with pro-action responses. As a result, anti-action frames appear less frequently in newspaper coverage of the issue – skeptical responses are sometimes featured in the articles, but sometimes they are not.

To illustrate, 221 of 744 articles do not include an anti-action frame, whereas only 50 articles do not include a pro-action frame. This may also be a function of the *New York Times* and an editorial agenda that is more likely to report on the seriousness of climate change than to minimize it (Insider Staff, 2014). However, even if the *Times* is politically left leaning, as has been charged (e.g., Groseclose and Milyo 2005), this should not necessarily affect the long-term trends examined in this study as long as the ideological leaning remains consistent.

Table 2 shows the relative frequency of anti-action and pro-action environment-economy frames over the 25 years of study.

**Table 2: Relative frequency of occurrence for environment-economy frames from 1988 to 2012.**

Base Code	Anti-action	Pro-action
Development	9%	5%
Cost	9%	8%
Jobs	3%	1%
Efficiency	1%	10%
Regulation	17%	11%
Carbon pricing	2%	3%
Fossil fuel industry	32%	4%
Green industry	3%	14%
Other industry	3%	4%
Risk	9%	10%
Energy independence	1%	2%
Equity	2%	4%
National Interest	10%	23%
Total	100%	100%

What is perhaps most apparent is that, while pro-action frames are generally distributed among five or six major arguments, anti-action frames are represented particularly heavily in *anti-fossil fuel industry interests* and *anti-regulation* arguments. Furthermore, some base codes appear well-matched in terms of relative distribution when normalized – such as *pro-* and *anti-cost* arguments – while others appear less matched, with one side much more prevalent than the other. For instance, *pro-efficiency* frames appear much more often among advocate arguments than *anti-efficiency* frames among skeptical ones. In essence, it appears that rather than matching *pro-efficiency* arguments head-on, skeptics direct the discussion elsewhere.

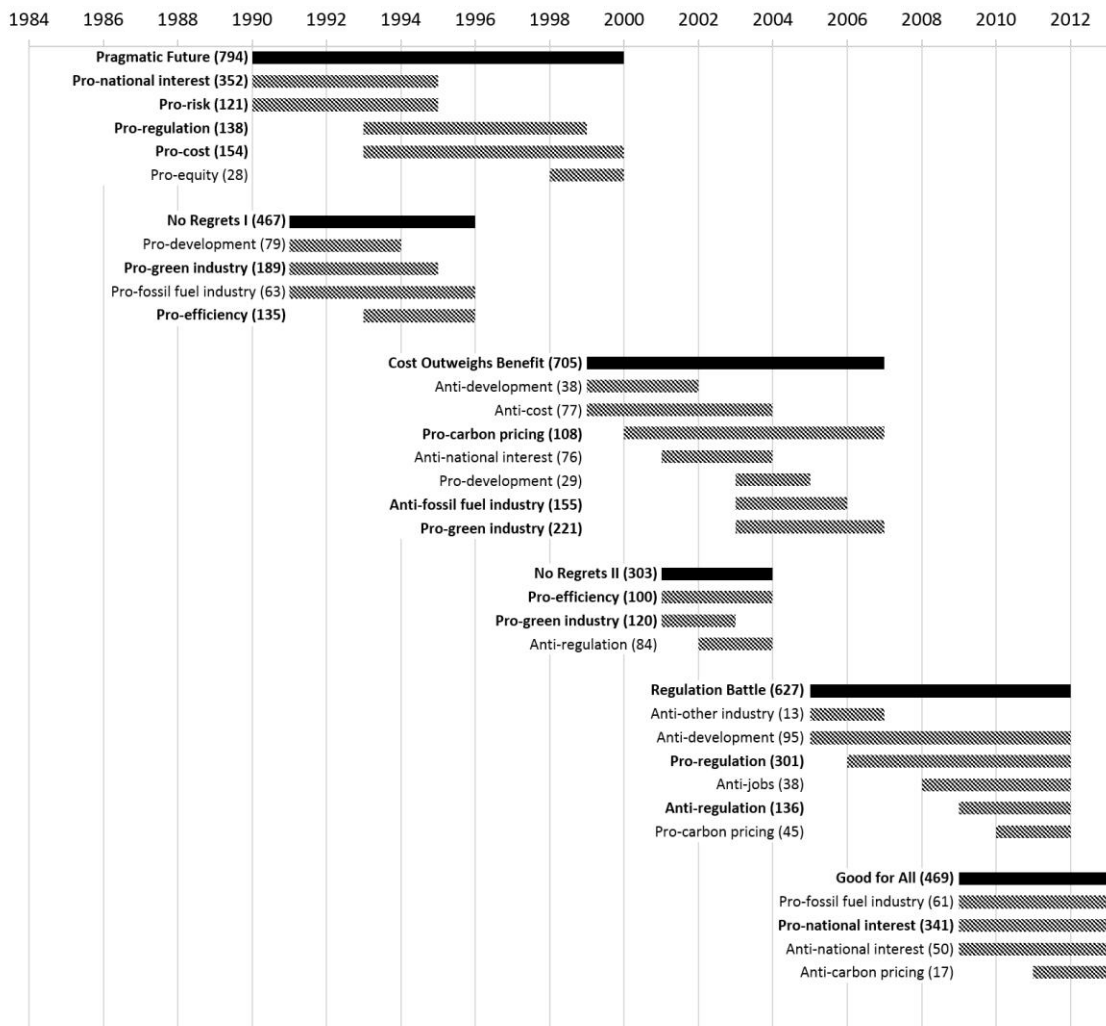
Multiple frames seem underrepresented in the data, including *pro-jobs* and *anti-green industry interests* arguments. However, it should be noted that a dearth of entries

for any particular frame may reflect its lack of resonance and salience in the political discourse. For instance, the arguments in the *anti-efficiency* camp generally focused on either the necessity of government-mandated energy efficiency programs or doubt that energy efficiency gains would have much of an impact on warming. That these arguments failed to gain traction perhaps speaks to the ability of certain arguments to resonate with sociopolitical values and become institutionalized in discourse, while others remain irrelevant (Hajer 1995).

### **2.3.2 Major storylines**

Based on the criteria of attention and weighted attention, the data show six major storylines in American public discourse on climate change over the 1988-2012 period. They are shown in Figure 1.





**Figure 1: Persistence of major climate change storylines from 1988 to 2012. Numbers in parentheses represent weighted attention. Solid lines denote the name and persistence of the overall storyline. Hashed lines indicate the persistence of the component frames of each storyline. Bolded frames are the most central to each storyline.**

These storylines – in chronological order – have been labeled “Pragmatic Future,” “No Regrets I,” “Cost Outweighs Benefit,” “No Regrets II,” “Regulation Battle,” and “Good for All.” The solid black lines in Figure 1 indicate the length of time each storyline persists, while the hashed lines under each solid line show the persistence of

each component frame in a storyline. Along with persistence, the numbers in the parentheses denote the weighted attention of each frame and the sum of weighted attention for each storyline; weighted attention can be thought of as a measure of each frame’s salience and resonance. Some storylines – such as “No Regrets II” – are quite short and include a limited number of component frames, while others, such as the “Regulation Battle” storyline, persist for years and switch out key component frames over time. These storylines are briefly described in Table 3.

**Table 3: Description of major storylines of climate change construction in American public discourse.**

<b>Storyline</b>	<b>Description</b>
<b>Pragmatic Future</b>	Climate action is justified given future risks and costs if left unattended.
<b>No Regrets I</b>	Pursuing energy efficiency and green energy sources is policy without drawback.
<b>Cost Outweighs Benefits</b>	Climate action is unjustified given material and developmental costs.
<b>No Regrets II</b>	Pursuing energy efficiency and green energy sources is policy without drawback (as long as these are voluntary actions).
<b>Regulation Battle</b>	What role should governmental regulation play in climate action?
<b>Good for All</b>	Climate action is desirable, though opposition still exists.

The first major storyline, which I have dubbed “Pragmatic Future,” developed in 1990 as society seemed ready to heed the warnings of the late 1980s to do something about climate change. As shown in Figure 1, the first five years of this storyline were dominated by *pro-national interest* and *pro-risk* frames. In the early days, the *pro-national*

*interest* arguments were comprised of claims that climate change would be deleterious to American interests, although they were somewhat unspecific given the prevailing scientific uncertainty regarding climate change's impacts. Typical *pro-national interest* frames from this period argued that climate change would decrease American quality of life and threaten American holdings through processes such as rising sea levels and flooding. These were paired with more specific *pro-risk* frames that established the diminishing returns of delaying climate change action – the notion that sluggishness to act in the present would lead to increased difficulties in the future. For instance, a 1990 article on a recently released Congressional Budget Office study of greenhouse gas taxation summarizes, “while there is no consensus on the rate of warming or the likely environmental damage, hardly anyone is eager to play Russian roulette with the biosphere” (Passell 1990).

In 1993, two more strong pro-action frames joined this initial pair, carrying the storyline all the way to 2000. *Pro-cost* frames supplemented *pro-risk* frames, alleging that the costs of action would increase over time as long as climate change remained unabated, that initial investments in climate action would provide long-term savings, or that such investments would actually be profitable in the future. The pair of *pro-cost* and *pro-risk* frames describes the “Pragmatic Future” storyline; this storyline emphasizes that climate change is a real problem and that it is pragmatic and forward looking to reduce future hardships by taking action now. To enable risk reduction and cost savings,

advocates argued for governmental regulation of carbon dioxide and other greenhouse gases.

The next major storyline focuses on the *pro-efficiency* and *pro-green industry* frames. This pairing can be traced to the popular notion of a “no regrets” climate policy, or government initiatives benefit the country regardless of the reality or severity of climate change (e.g., Passell 1991). Often, this policy package focused on improving energy efficiency and conservation and developing alternative renewable energy sources. This storyline also incorporates arguments that such a policy would be a boon for American economic development and provide investment opportunities for fossil fuel companies to advance their businesses.

While the first two major storylines focused entirely on pro-action arguments, opposition to climate action had been present in public discourse since the genesis of the issue. In fact, the seventh-most powerful storyline by weighted attention (not shown in Figure 1) lasted from 1988 to 1992 and was dominated by *anti-fossil fuel industry* frames, as well as a complement of *pro-risk* and *pro-equity* arguments. These pro-action components are unsurprising given that early discussions of climate change, particularly in international politics, centered on longstanding environmental disputes between developing and developed countries about responsibilities and risks (Roberts and Parks (2007). However, these concerns were coupled with strong resistance from the fossil fuel industry. The fossil fuel industry understood early on that climate action might be

harmful or even disastrous to their business practices and mobilized strongly to shape American governmental and societal attention to the issue (Lahsen 2005). They were largely successful, building up influential financial and political structures to advance their self-preservation agenda. For example, the Global Climate Coalition, a politically active lobbyist group funded by the Western Fuels Association, lobbied against climate action in the guise of a non-profit organization (Jacques et al. 2008).

The next major storyline continued the trend in increased political antagonism toward climate action. The “Cost Outweighs Benefit” storyline posits that while climate change may be a real concern, action to combat it would be costly both monetarily and in terms of the nation’s economic development. Indeed, these two anti-action arguments originated this storyline by arguing that “any effort to regulate carbon dioxide emissions could deal a severe blow to the energy industry and to the American economy” (Jehl and Revkin 2001). The two anti-action frames were later joined by the complementary notions that climate action would be detrimental to American interests – particularly to the nation’s standing in world politics – and cripple the fossil fuel industry, which is too important to lose.

However, these anti-action elements were countered by strong pro-action frames that carbon dioxide and other greenhouse gases needed to be priced and, later on, that renewable energy and other green industries would be necessary to provide a “new energy future” for the nation (*New York Times* Editorial Staff 2003). The call for carbon

pricing is interesting because it stems from environmental policy institutions that promote market-based pollution controls over top-down regulation. These instruments, such as carbon cap-and-trade markets and carbon taxes, can be considered the legacy of the Republican environmental policies of the late 1980s (namely, the creation of sulfur dioxide markets) and of the understanding that similar policies would be the most efficient and politically expedient given the Republican administration at the time (Buell 2003).

Some storylines fall dormant and reemerge later. This sort of discursive behavior may be seen in the “No Regrets II” storyline from 2001 to 2004, which continues the earlier “No Regrets I” storyline of the 1990s. The second storyline is based on the same *pro-energy efficiency* and *pro-green industry* frames as the original, building on the idea that greater investment in energy efficiency and renewable energy can only lead to desirable outcomes. However, that pair is joined by *anti-regulation* arguments that reflect the environmental policies of the early George W. Bush era, which denigrated governmental regulation in favor of business-friendly voluntary action (Layzer 2012). Consequently, this storyline is a product of its time – a defense of social benefits tempered by strong anti-regulatory sentiments.

Starting in 2005, advocates and skeptics of climate action began seriously debating the merits of governmental action on climate change beyond industry and private voluntary actions, a storyline that I have named the “Regulation Battle.” From

the pro-action side, advocates strongly argued for governmental intervention to combat climate change, accusing the George W. Bush administration of ignoring the issue and creating a leadership vacuum. For instance, one published letter argued that despite there being “no reason to expect leadership from the Bush administration and its allies in Congress,” policymakers must act on climate change and that voters should only elect politicians willing to do so (Kenosian 2006). Moreover, pro-action frames expressed skepticism that voluntary greenhouse gas reductions by industry would ever amount to any real ameliorative effect on warming. Instead, advocates contended that the government ought to take a more aggressive stance toward the issue, particularly in the form of state-mandated carbon pricing schemes, which theretofore had only been privately managed in the US.

Skeptics, meanwhile, stood in staunch opposition to governmental intrusion into the economy, arguing that such action would damage development and economic growth. As the economic recession of the late 2000s began to dominate American politics, these anti-action frames were buttressed by claims that action would exacerbate unemployment and by fears that the incoming administration of President Barack Obama would keep campaign promises to move strongly against climate change. For example, an article following the EPA’s 2009 ruling that climate change constituted a public health risk cited “[i]ndustry groups [who] said that the finding and the proposed regulations would damage the economy and drive jobs overseas” (Broder 2009).

Consequently, skeptics reinforced their distrust of government regulation as a valid method of addressing the issue.

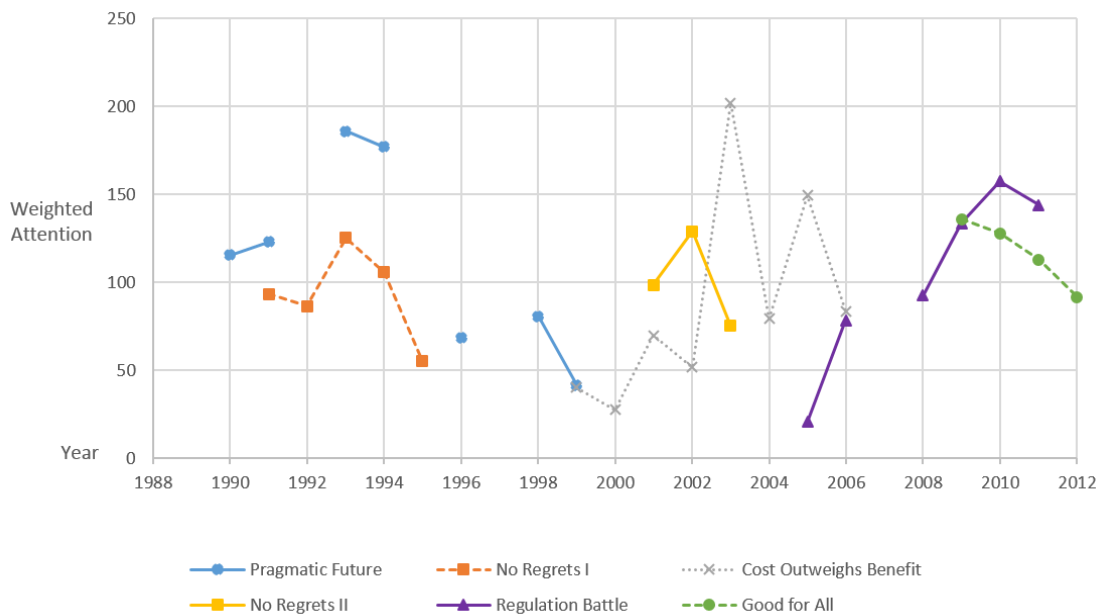
The final major storyline comes at the tail end of this study period, starting in 2009. This “Good for All” storyline includes both pro-action and anti-action component frames but is largely dominated by *pro-national interest* arguments. By the late 2000s, increased public and political support for environmentalism led to an upsurge in concern about climate change. These *pro-national interest* frames centered around two major arguments: the belief that material damages to American interests are already being felt in the forms of extreme weather events and sea level rise and the desire for the US to lead the international political process. For instance, a Paul Krugman column began with a declaration that “[t]he 2008 election ended the reign of junk science in our nation's capital” (Krugman 2009). However, these ambitions were tempered by skepticism that climate action would be in the national interest, particularly if it means increased governmental regulation. At this point, these objections appeared to stem more from ideological than from policy grounds. Anti-action rhetoric at this time was explicitly linked to a resurgence of populist conservatism with the newly-Republican House of Representatives and from conservative politicians. For example, Texas Governor Rick Perry was reported as saying, “[o]ur dispute with the EPA in particular illustrates how Washington's command-and-control environmental bureaucracy is



destroying federalism and individuals' ability to make their own economic decisions” (Galbraith 2010).

### 2.3.3 Storyline transitions

Figure 2 shows that storylines do not follow one after the other but instead frequently overlap as one storyline fades out and is replaced by new lines of rhetoric. Analyzing these transition periods provides insights into how focusing events correlate with changes in public discourse.



**Figure 2: Annual weighted attention scores for major storylines from 1988 to 2012.**

The rise and fall of storylines may correspond to shifts in climate politics and wider shifts in American politics. From Kingdon’s (1995) multiple streams model of

agenda setting, these events constrain the field of applicable political and policy discussions to ones that fit the “window of opportunity” presented by the event.

If focusing events do causally affect how climate change is framed in American public discourse, or represent observable markers of changes in the political climate, they may act as an information feedback mechanism in newsmedia coverage. Liu et al. (2009), drawing upon agenda-setting work by Kingdon (1995) and Jones and Baumgartner (2005), conducted a study examining newsmedia and Congressional attention to climate change, measured by how often the issue was reported on in newsmedia coverage and by how many Congressional hearings were held on the issue, respectively. They found that attention is driven in part by information feedback from the scientific community in the form of published scholarly articles, books, and reports. However, they do not examine feedback from other information sources, such as public opinion polls, interest group pressures, or other forms of information that may represent (directly or indirectly) the political climate around climate change.

Storyline transition may move in conjunction with electoral turnover, particularly situations when Congressional or executive power shifts from one party to another. For instance, the Pragmatic Future and No Regrets I storylines of the early 1990s were comprised exclusively of pro-action frames, arguing that climate change is a problem worth addressing. With the 1994 Republican takeover of Congress and the ensuing period of “environmental science under siege,” such green notions were no

longer politically feasible, and indeed, they came under heavy fire (Brown 1997). These political changes are reflected in the discourse on climate change as both storylines failed in the immediate aftermath of the Republican win.

For another example, with the election of George W. Bush to the presidency in 2000, the public discourse of climate change reflected increased opposition to climate action, particularly to governmental regulatory action (Kolbert 2006). This era of environmental policy is most easily characterized by a turn away from governmental oversight and a reliance on voluntary behavioral change from polluting firms (Lahsen 2005, Layzer 2012). These themes seem to be carried forward in the two major storylines of the early-mid 2000s: Cost Outweighs Benefit and No Regrets II. In particular, the “No Regrets II” storyline from 2001 to 2004 continues the earlier “No Regrets I” storyline of the 1990s. These storylines are based on *pro-energy efficiency* and *pro-green industry* frames, building on the idea that greater investment in energy efficiency and renewable energy can only lead to desirable outcomes. However, in this second iteration, this pair of frames is joined by *anti-regulation* arguments that reflect the *laissez faire* environmental policies of the George W. Bush administration, which denigrated governmental regulation in favor of business-friendly voluntary action (Layzer 2012). Consequently, this storyline is a product of its time – a defense of climate action’s social benefits tempered by strong anti-regulatory sentiments.

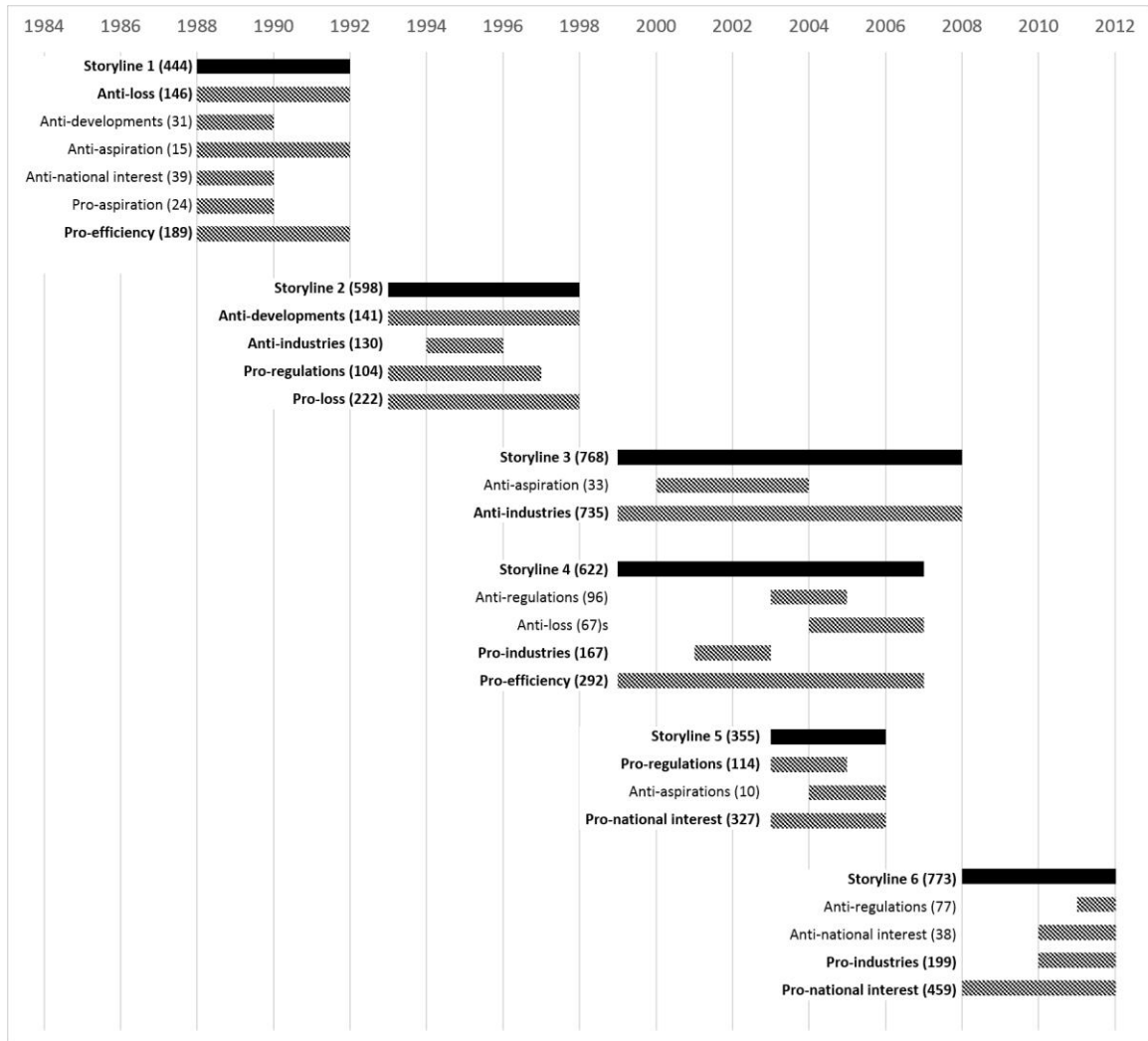
These instances of storylines changing in conjunction with electoral turnover may be a function of how the newsmedia reports on such events. For instance, Kathleen Hall Jamieson and Paul Waldman (2004) note that the media cover elections like sporting events and play up the rival sides as winners and losers. Newsmedia coverage then prioritizes the framing agenda of victors, potentially setting up new storylines for rhetorical dominance, while also granting some coverage to the loser in order to set up more perceived drama. This sort of effect may explain the relationship between electoral changes and storyline transitions (tenuous as that relationship is from this study). When a political party takes over an important institution such as a house of Congress or the presidency, media coverage amplifies their communication and framing on issues, climate change included.

Climate change politics scholars have posited other possible focusing events that have driven framing on the issue. Liu et al. (2009) find that the release of scientific reports on climate change is associated with increases in newsmedia and Congressional attention to the issue. Other scholars suggest that changes in national economic conditions, such as the 2008 US economic recession, cause climate change action to be reframed in terms of economic recovery, more specifically as hampering recovery (Obani and Gupta 2015). Yet another possibility of focusing events affecting storyline transition may be the occurrence of extreme weather events that are publicly associated with climate change. Werner (2014, unpublished) finds that after Hurricane Sandy hit

the Mid-Atlantic US in 2012, regional newspapers sharply increased in pro-action framing and decreased in anti-action framing.

To check the robustness of the storylines I found, I ran a second analysis using the same data coded with a simplified scheme. Rather than the 13 base codes used in the original analysis, this alternate analysis condenses my environment-economy frames into seven categories. To do so, I combined some of the most similar frames. For instance, although carbon pricing schemes do not necessarily require governmental regulation (e.g., Margolis 2005), these two do overlap enough to be justifiably merged. These two frames were thereby combined into a *regulations* frame. Previous *cost* and *risk* frames were combined into a code called *loss* given that both deal with loss-framing (Kahneman and Tversky 1979). *Development* and *jobs* frames were combined into a *developments* frame. *Energy independence* and *equity* were combined into an *aspiration* frame. Finally, all three *industry interests* frames (*fossil fuel*, *green*, and *other*) were combined into an *industries* frame. Codes for *efficiency* and *national interest* remained unchanged.

After a second round of evolutionary factor analysis with these consolidated frames, I find a new set of six major storylines, shown below in Figure 3.



**Figure 3: Persistence of alternate major climate change storylines from 1988 to 2012. Numbers in parentheses represent weighted attention. Solid lines denote the name and persistence of the overall storyline. Hashed lines indicate the persistence of the component frames of each storyline. Bolded frames are the most central to each storyline.**

From this robustness check using substantially fewer frames, I find that the alternate storylines generated are overall largely similar to those of my original analysis. While the composition, temporal setting, and duration of these alternate storylines may

differ from the original six, some appear to be clear analogues. For instance, the alternate Storyline 4, with its focus on *pro-industries*, *pro-efficiency*, and *anti-regulations* frames, resembles the No Regrets II storyline of George W. Bush-era *laissez faire* environmental policy. Alternate Storyline 6, meanwhile, is comparable to the Good for All storyline in composition, with both prominently made up of *pro-national interest* and *pro-industries* frames. Although not shown in Figure 3, I also find an analogue for the original No Regrets I storyline in an alternate storyline composed of *pro-efficiency* and *pro-industries* frames lasting from 1993 to 1996.

Some storylines found in the alternate analysis seem like incomplete analogues of original storylines while others appear totally novel. For instance, alternate Storyline 2 shares some similarities with the Pragmatic Future storyline with its *pro-regulation* and *pro-loss* frames, but also includes some anti-action frames not seen in the original version. Storyline 3 resembles the original Cost outweighs Benefits storyline given its temporal position and composition of *anti-industries* frames, but lacks the original's variety of other frames. Alternate Storyline 1, on the other hand, does not seem to have much at all in common with storylines generated from the original analysis, even original storylines not included in the top six by weighted attention.

## **2.4 Discussion**

### **2.4.1 Implications**

This study suggests that the construction of climate change in American public discourse has been fairly fluid, with no dominant storyline. This finding stands in contrast to Baumgartner et al.'s (2008) examination on how capital punishment has been communicated. There, Baumgartner et al. (2008) find that, although the issue has been historically framed and reframed through a variety of storylines, the public discourse has largely crystallized around one storyline prevailing in salience, resonance, and persistence. This storyline, which they dub "innocence," is first seen in the late 1990s and quickly establishes discursive dominance with a weighted attention score more than double the next most salient and resonant storyline as well as persistence that extends through the end of their study period.

I find no such dominance in climate change discourse. The most salient, resonant, and persistent storyline is the "Pragmatic Future" storyline that disappears by 2000. The only extant storylines through 2012 are "Good for All" and, possibly, "Regulation Battle," although they both lag behind "Pragmatic Future" in terms of weighted attention. This suggests that there has been no consensus understanding of climate change in public discourse; the issue has continuously been presented to the public in different manners, with no single storyline definitively conveying the issue. Moreover, the assumptions that undergird the issue – such as the necessity of action –



are still contested and may be influenced by focusing events such as electoral changes or extreme weather events. In the terms of Bruno Latour (1987), climate change has not yet been made into a “black box” whose construction is taken for granted and treated as a foundation for future development. This finding may speak to the historical low levels of public salience on climate change (e.g., Pew Research Center 2015b), whereby due to a lack of public engagement on the issue, framing and storylines on climate change have not crystallized. This lack of cohesion may contribute to the observed delay in political and policy action.

Though this study makes a novel contribution by describing how climate change has historically been framed in the public discourse, it is limited in three ways: scope of time, scope of arguments, and scope of framing. Regarding scope of time, this chapter may be improved by a dataset that extends past 2012 to describe the public discourse on climate change past that date. For instance, it would be illuminating to see whether or how storylines changed as a result of the 2014 Republican takeover of the Senate or other focusing events, such as the 2015 Paris Agreement wherein nations agreed to a series of resolutions to reduce greenhouse gas emissions, marking a possible watershed moment in international climate politics (Doyle and Lewis 2015). Regarding scope of arguments, this study includes only environment-economy frames and, while the coding scheme is quite comprehensive and captures a variety of economic domains such as equity and uncertainty of risk, it does not capture frames such as scientific arguments lacking an

economic connection, which may have limited the storylines generated via evolutionary factor analysis.

In terms of scope of framing, by splitting up environment-economy climate change arguments into 13 base frames, I may have found less cohesive storylines than if I had coded articles using fewer base frames. Indeed, although each of the 13 base frames I define refer to different aspects of climate change politics, they may not be totally exclusive. For example, the *carbon pricing* frame may be seen as a subset of the *regulation* frame given that setting a price on carbon for a cap-and-trade or tax system is usually seen as a part of governmental regulation, though exceptions of private climate exchanges do exist (e.g., Margolis 2005). This question of frame exclusivity presents some downstream implications as well. For instance, the evolutionary factor analysis method may produce storylines with longer durations or higher overall weighted attention scores as arguments are consolidated into fewer frames.

However, after conducting an alternative analysis with an alternate coding scheme that combined frames from the original analysis, I found numerous similarities between the storylines generated from the two sets of models. Given how dissimilar the two coding schemes are – and how storylines generated via the evolutionary factor analysis method are entirely dependent on the coding scheme fed into it – I find my original framing definitions and generated storylines to be quite robust given the similarities in end outcomes.

Although I used only one newspaper as a source, I do not consider the sole use of *New York Times* articles a limitation of this study given that prior content analyses of climate change coverage in American newsmedia find no major differences between the *Times* and other prestige newspapers (Liu et al. 2009). Further, I sought out major storylines in the mainstream public discourse on the issue, for which the *Times* is an excellent data source (Liu et al. 2009), rather than niche discourses that may be found in narrowcast, ideologically driven media, such as blogs or talk radio programs. However, it may be argued that the *Times'* power as a media and discursive agenda-setter has decreased with the proliferation of "new" media such as internet publications (Meraz 2011). In that case, data from the latter part of the 2000s may be less authoritative than earlier data in terms of representativeness of the public discourse.<sup>2</sup>

A final consideration in this chapter is who has agency in newsmedia coverage of climate change – the newsmedia or the sources upon which the newsmedia rely to provide quotes and context on the issue? In other words, does the newsmedia shape the public discourse on climate change or do issue actors such as pro-action activists and skeptical political elites shape the issues with newsmedia being passive distributors of this information? In some ways, this question harkens back to a long-standing debate in communication research: is the role of the newsmedia to act as a "gatekeeper" deciding

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<sup>2</sup> The Huffington Post, the most influential news blog by site visits (Meraz 2011), started in May 2005. Perhaps that would be a fair date to mark the rise of new media.

what is newsworthy and how to frame it (e.g., Lippman 1922, White 1950, Barlizai-Nahon 2009) or to merely “index” and reflect the rhetoric of political elites (e.g., Hallin 1986, Bennett 1990)? Each theory suggests that a different voice influences how issues are framed and constructed in public discourse.

In this chapter, my coding method reflects aspects of both positions. For instance, my coding was mostly driven by quotes from issue actors in news articles and sometimes by arguments made directly by political elites in the form of opinion pieces, which may favor the indexing theory. However, journalists choose which quotes and sources to include in news articles, and editors decide which opinion pieces are published, so the needle swings towards gatekeeping. Consequently, this chapter cannot answer the question of which actor has agency one way or the other.

Depending on whether the indexing or gatekeeping model is more correct, however, may have substantive implications for this study. If the newsmedia index elite discussions of climate change, the storylines generated in this chapter, which are presumed to represent the public discourse on climate change, are a product of elite discourse. If the newsmedia are gatekeepers, then these storylines may reflect the biases of journalists and editors at the *Times*, giving journalists outsized influence on shaping political discourse. Perhaps a middle road to untangle this question of agency is in Entman’s (2003) cascading activation model, which combines elements of indexing, gatekeeping, and also public opinion in explaining how news is framed. However, this

model has not been evaluated much in the media, perhaps due to the difficulty in teasing out consistent causal effects on newsmedia coverage.

The connection between focusing events and storyline transition needs to be further researched to draw causal conclusions. It should be noted that this chapter can make no causal claims as such, but merely presents some potential leads for future work. Given the limited number of occurrences for some of these potential focusing events (e.g., economic recessions), I would recommend this research be done using a qualitative process-tracing approach (Bennett 2010) wherein researchers analyze in depth how newsmedia communication changes (or does not change) in response to proposed focusing events. This process-tracing analysis could conceivably take any of the three forms described by Beach and Pederson (2013). Given a particular theory about how focusing events impact the public discourse on climate change – for instance, if electoral changes affect storyline transition – researchers might take a theory-testing approach to examine if there exists a causal mechanism linking the two. Absent theory going into the endeavor, researchers could perform theory-building process-tracing to identify a plausible causal mechanism linking a focusing event to a change in storyline prominence. Last, researchers could go the reverse direction by examining a particular shift in a storyline’s prominence and then identifying the focusing event mechanism that may have led to this change in discourse. This third approach would be the most

theoretically limiting variant of process-tracing as it is case-centric rather than theory-centric (Beach and Pederson 2013).

#### **2.4.2 Alternative explanations**

While I focus on environment-economy frames in this chapter, other frames have been catalogued and studied in the literature on American climate change politics. For instance, Myers et al. (2012) contend that climate change has been historically framed in terms of an environmental problem – focusing on ecological impacts rather than sociopolitical concerns. However, they do little to justify this assertion. Other frames include arguments concerning national security, public health, and extreme weather events (Nisbet 2009, Nisbet and Scheufele 2009). Although these frames were not explicitly mentioned in my coding scheme, arguments along these lines were typically included for analysis in this chapter, just under different codes. For instance, arguments that climate change impacts present threats to public health were coded under the *risk* frame and concerns over national security were either coded under *risk* for explicitly threat-based arguments or *national interest* for less explicit statements. As a result, including these other frames in my coding scheme may have altered the distribution of frames for storyline construction. Another way of recategorizing the frames I defined from what is in the literature may be the inclusion of a “loss-based” or “fear” frame, which is based around the idea that climate action (or a lack thereof) is associated with

losses from the status quo (Moser 2007, Jost et al. 2007). In terms of my coding scheme, *risk* and *cost* frames fit into this “loss” concept.

Perhaps a more glaring omission is the failure to code arguments about the validity of climate change as a scientific issue, a prevalent and persistent element of American climate change politics (Buell 2009, Oreskes and Conway 2012). These scientific uncertainty frames, which Hoffman (2011) calls “diagnostic” frames, have been central to the discussion on climate change in American politics but were not included into my coding scheme due to a lack of clear economic linkage. If these frames were included, I may have well found different storylines from the evolutionary factor analysis model, or even a truly dominant storyline based on this concept of scientific uncertainty, particularly the skeptical argument that climate action is unjustified given uncertainties in climate science, climate modeling, and the role humans play in warming. This is a particularly notable and limiting consequence of my emphasis on environment-economy linkages in my analysis.

## **2.5 Conclusion**

In this chapter, I presented a data-driven historical analysis of how climate change has been framed and communicated over its first 25 years of relevance in American politics. In particular, I focused on climate change’s evolution as an environmental-economic issue, or an environmental issue that is communicated along economic lines. I identified six major storylines that encompass how climate change has

historically been represented in American public discourse, moving from strong pro-action sentiments in the early 1990s to a skeptical, conservative backlash in the 2000s and a mixed battlefield in the 2010s. I then explored how possible focusing events, such as extreme weather events or the George W. Bush presidency, may correlate with transitions in major storylines, shaping – or at least reflecting – the state of climate rhetoric at the time. In doing so, I establish a foundation for understanding climate change’s place in American political communication that will inform the subsequent chapters. In Chapters 3 and 4, I examine how pro-action and anti-action frames are disseminated in public discourse and explore whether a polarized information environment constrains attempts at political communication.



### **3. Heated Talk: Economic Framing in American Climate Change Newspaper Coverage**

Despite enjoying bipartisan support in the late 1980s, climate change later developed into a much more contentious issue in American politics into the 2010s. The literature on political communication and framing abounds with possible explanations for how climate change became so polarized. In particular, Andrew Hoffman (2011) notes that the reverse of polarization is negotiation: two rival sides coming together in order to compromise. For negotiation to succeed, two sides – in this case, advocates and skeptics of climate action – must be able to communicate on common ground.

However, this is more difficult than it sounds. Large, complex issues like climate change are problematic exactly because they take on so many dimensions and may be framed in so many different ways, some of which may be more favorable to one side than the other (Baumgartner and Jones 1993). When two sides are able to speak on the same dimensions of an issue – in other words, with matching frames – negotiation and compromise become possible. If, however, two sides create a discourse in which they consistently talk past each other with non-matching frames, Hoffman (2011) suggests that demonization and polarization may arise. This possibility strengthens when such “talking past” is picked up and amplified by the media, institutionalizing this framing dynamic and spreading it to the public. Consequently, the dissemination of climate advocate and climate skeptic frames into the public discourse by the newsmedia has

been touted as a possible contributor to the current polarized information environment surrounding the issue (Hoffman 2011).

In this study, I examine how climate change has been discussed in American politics, particularly how pro-action and anti-action frames have historically been disseminated into the public discourse. In doing so, I evaluate the talking past hypothesis of polarization, which posits that rival frames may exacerbate polarization if two sides consistently argue their own points while ignoring the other's (Hoffman 2011). In other words, rather than seeking common ground for a potential negotiation, the two sides simply talk past each other. Using a dataset drawn from 25 years of *New York Times* coverage on the issue of climate change and a variety of content analysis methods, I do not find that talking past has increased over time. This result is not consistent with the talking past hypothesis of polarization, which states that increasing occurrences of talking past have driven public polarization on the issue. Instead, I find that talking past has largely remained stable, with some evidence that media discourse of climate change has actually trended towards matching over time.

### **3.1 Background and Theory**

Climate change has been widely labeled a pressing issue facing modern society, yet governmental action to combat warming seems more distant in 2016 than it did in 1988. Over the past decades, the scientific understanding of climate change – which seems robust (e.g., Cook et al. 2013) – has been overtaken by the possible costs, risks, and

other economic implications of the issue. These environment-economy frames on climate change (described in Chapter 2) abound in the public discourse on climate change on both sides of the issue – pro-action and anti-action. However, how are these frames distributed in climate change communication?

### **3.1.1 Matching versus talking past**

Given that both skeptics and advocates use economic framings of climate change, it seems plausible that the two sides would eventually be able to compromise and come to a resolution. After all, they are speaking the same language. However, while economic framings of climate change are commonplace, the use of different environment-economy frames by skeptics and advocates may create rival social understandings of the issue. As semiotician Bruno Latour (1987) argues, truth is socially generated when claims are consistently repeated and disseminated in public discourse, becoming normalized in the process. While both skeptics and advocates use economic framings of climate change, their use of separate sets of cues and frames may create and institutionalize two incompatible truths of the issue – climate change action is argued to be both good and bad for the economy.

To clarify the terminology, discourse refers to systems of communication “in the broad range of everything which can be said or talked about or symbolized within a particular, recognizable domain” (Scollon et al. 2012, p. 8). That is, discourse may be a hazy concept, but as it is used here, it is loosely equivalent to “topics of discussion.” The

public discourse then refers to topics that are discussed in the public, including public opinion. Media discourse is communication that occurs among and is received from media sources. In this study, the focus is on mainstream newsmedia. While the public discourse and media discourse are distinct, they are intertwined and in dialogue with each other (see Entman 2003).

Andrew Hoffman (2011) points out that the process of negotiation, or concessionary engagement, can only occur if two sides conceptualize climate change using comparable frames – or arguments along the same dimensions of some issue. If discourse is characterized by this sort of “matched” framing, both sides appear to be in dialogue, and the public should be able to readily compare arguments and positions. Frank Baumgartner and Bryan Jones (1993) label this dynamic “contradictory argumentation,” where rival frames match topics but in opposite directions, allowing for debate and perhaps settlement. This process is akin to Sigelman and Buell’s (2004) discussion of issue convergence, when two rival political campaigns set up the “great debate” idealized in campaign politics (p. 651).

The other form of framing strategy Baumgartner and Jones profile is noncontradictory argumentation, in which competing frames will shift attention away from a rival frame and instead focus on more strategically favorable themes. This type of framing interaction may be more destructive; rather than engagement, political opponents talk past each other using their own desired talking points and showing

contempt for their rival's (Hoffman 2011). Taken to the extreme, talking past may increase the risk of issue polarization, as the two sides are presented as perpetually combative and incompatible. This hypothesized source of political polarization suggests that as long as rivals talk past each other, the possibility of resolving their arguments appears farther and farther away.

These two modes of climate change communication may be summarized as follows: if economic arguments match, there is an opportunity for political negotiation and compromise between skeptics and advocates. However, if arguments fail to match, i.e., talk past each other, the possibilities of demonizing the other side and increasing political polarization on the issue arise.

### **3.1.2 Media effects**

In the competitive information environment that has grown around climate change, the arguments seen in the public discourse have long been tied to the information disseminated by the mainstream newsmedia (Boykoff and Boykoff 2004, Crow and Boykoff 2014). This is due to the power of the newsmedia to package and distribute information for public consumption, essentially setting the stage for which issues the public considers, how those issues are constructed, and how the public is oriented to perceive them (Iyengar and Kinder 1987, Zaller 1992). As McCombs and Reynolds (2009) write, "there is a fundamental link between media attention to an object and the existence of opinions about it" (p. 10). As the American newspaper of record, the

*New York Times* may attract climate skeptics and advocates by providing a prime venue in which to disseminate their respective framings of climate change to the public.

Climate change is a conspicuously polarized issue in American politics, particularly at the public level (McCright and Dunlap 2011b, Pew Research Center 2015c). Given this polarization, I consider whether talking past can be observed in the historical presentations of environment-economy framing of climate change in popular newsmedia. These frames are highly prevalent in the discussion on climate change in American politics and thus present good opportunities to compare the distribution of pro-action and anti-action arguments on the issue.

If the data show significantly increased talking past over time, this would be necessary – if insufficient – evidence for the notion that communication has increased issue polarization. In other words, if the talking past hypothesis of polarization is true, an examination of historical environment-economic framing of climate change in popular news coverage will reveal an increasing trend in the amount of talking past between pro-climate action and anti-climate action frames between 1988 and 2012.

## **3.2 Methods**

### **3.2.1 Data**

This study uses the same dataset as Chapter 2, which consists of 744 randomly sampled climate change–centric articles published in the *New York Times* between 1988 and 2012. These articles were coded for environment-economy frames along 13 base

codes, with each code split between a pro-action frame and an anti-action frame (shown in Table 1). For instance, the *jobs* base code is split between *pro-jobs* arguments claiming that climate action will increase or improve jobs and *anti-jobs* frames contending that climate action will decrease or damage jobs.

### **3.2.2. Analysis**

I first provide summary statistics and describe the distribution of frames over the 25-year period of study. I also provide key examples of framing behavior, both overall and over time. I then examine how each side combines frames in order to create narratives of issue linkages.

To examine whether environment-economy frames on climate change match or talk past each other over time, I estimate a model using Kullback-Liebler divergence. This metric measures the distance between two probability distributions over the same event space, expressed as a logarithmic ratio (Kullback and Leibler 1951). In this project, I measure how the distributions of pro-action and anti-action frames, as vectors, differ from each other over the 1988-2012 period. In the social sciences, this model has been used in econometrics (Smith et al. 2006) and analytical political science research (Grimmer 2010). The equation for the one-sided model is shown here:

$$D_t(P_a||P_p) = \sum_{x=1}^{13} P_{ax,t} \ln \left( \frac{P_{(a,x,t)}}{P_{(p,x,t)}} \right)$$

where  $P_a$  is the probability distribution of anti-action frames, and  $P_p$  is the probability distribution of pro-action frames over the 13 base codes ( $x$ ) for environment-economy frames across each instance of  $t$  where  $t$  is each of the 25 years from 1988 to 2012. Given that this is a logarithmic ratio, as frames match – that is, closing the distance between  $P_a$  and  $P_p$  – the ratio approaches 0. As frames talk past, extending the distance between  $P_a$  and  $P_p$ , the ratio increases away from 0.

For this analysis, I estimate a two-sided Kullback-Liebler divergence model, which is the sum of the two respective one-sided models, i.e., the sum of divergence from  $P_a$  to  $P_p$  and from  $P_p$  to  $P_a$ . To correct the asymmetry of this measure, I take the sum of both directions:

$$D_t(P_a, P_p) = D_t(P_a||P_p) + D_t(P_p||P_a)$$

This specification is justified given that a one-sided model simply estimates the divergence of one probability distribution from another. This is acceptable for more conventional uses of Kullback-Liebler divergence, which generally estimate the difference between some given probability distribution and an ideal distribution. Given two sets of observations, it becomes necessary to observe the joint divergence of each probability distribution from the other unless one distribution is *a priori* thought to diverge from the other, for instance, if anti-action frames are thought to especially

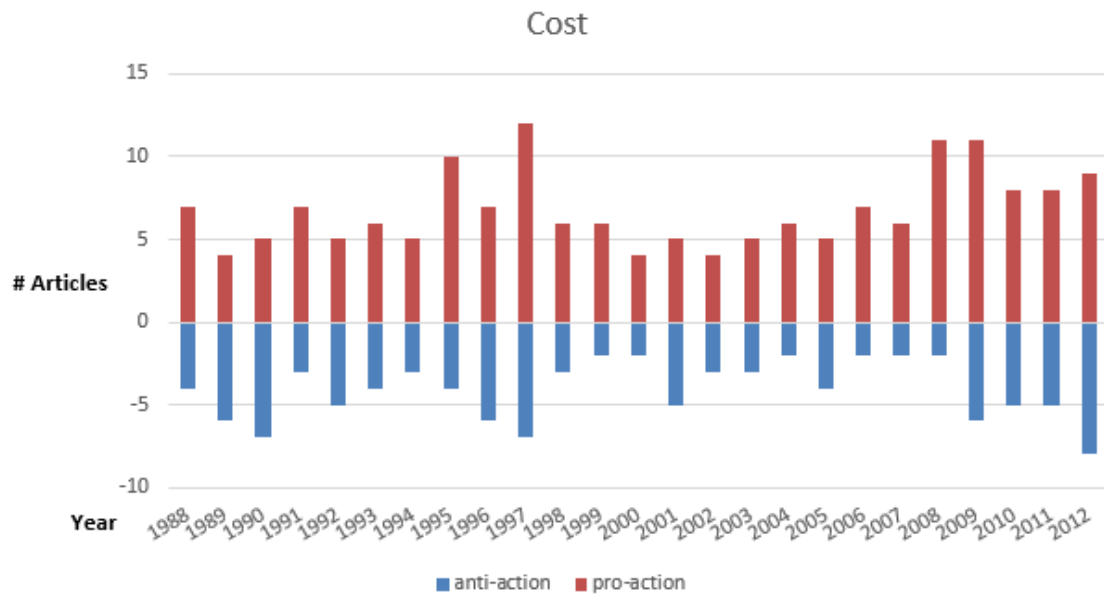


diverge from pro-action frames rather than vice versa. This is not likely for climate change, as both sides are known to demonize the other (McCright and Dunlap 2011b).

### **3.3 Results and Discussion**

#### **3.3.1 Framing types**

Figures 4 and 5 show two base frames that exemplify the matching and talking past distributions. Arguments including a cost element represented nine percent of all anti-action arguments and eight percent of all pro-action arguments, showing relatively even matching in the media discourse on climate change between 1988 and 2012 (Figure 4). Here, we see that both skeptical and advocate framing appear to give cost considerations roughly equal merit. In contrast, frames considering whether governmental action on climate change is in the interests of the fossil fuel industry make up nearly one-third (32 percent) of all anti-action frames and only 4 percent of all pro-action frames (Figure 5). This distribution suggests some elements of talking past – skeptical arguments that climate action would deleteriously impact fossil fuel-intensive industries are sometimes addressed with *pro-fossil fuel interests* frames, but not very often.



**Figure 4: An example of a matching frame distribution. The vertical axis indicates the number of each type of argument in each year. Anti-action codes are in negative units for easier comparison.**

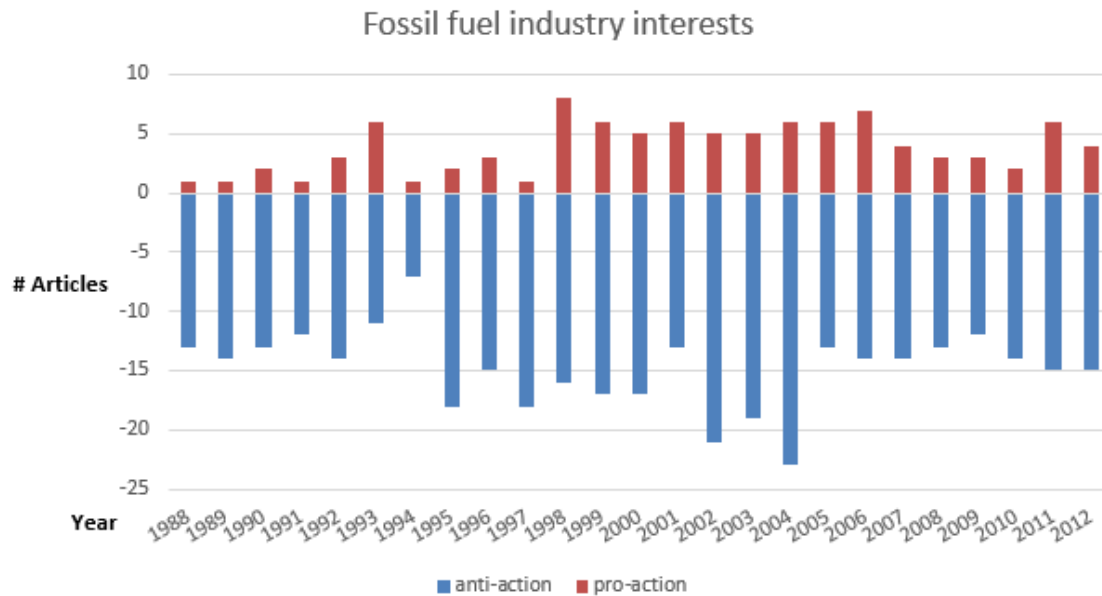
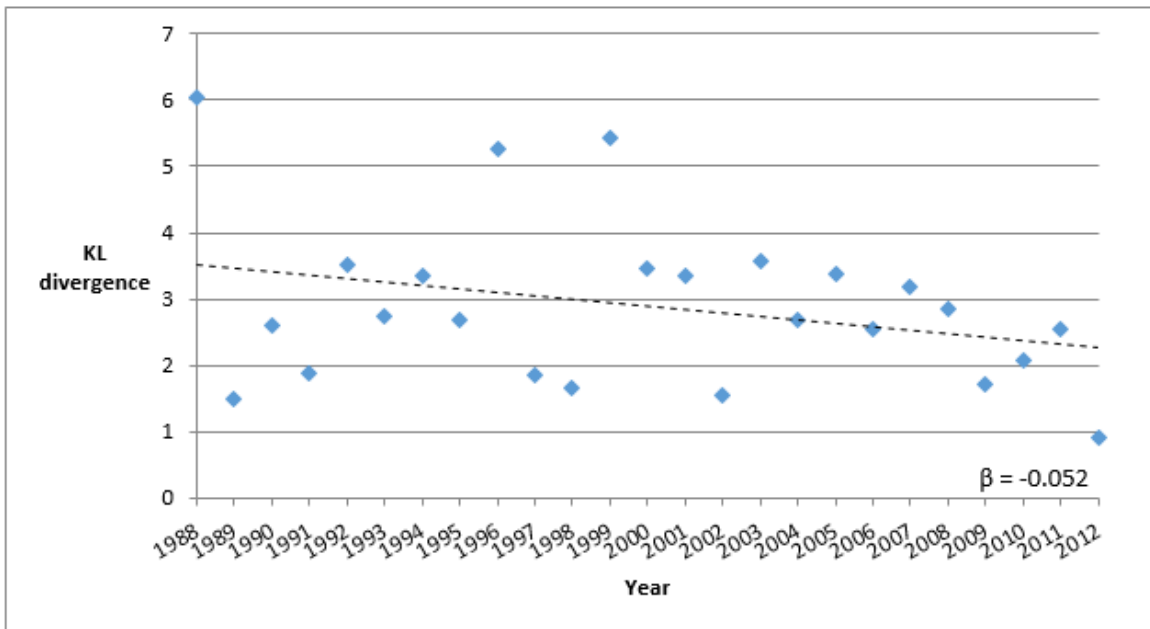


Figure 5: An example of a talking past frame distribution. The vertical axis indicates the number of each type of argument in each year. Anti-action codes are in negative units for easier comparison.

### 3.3.2 Matching or talking past?

If the talking past hypothesis of polarization is true, I would expect to see an increase in talking past frames compared to matching frames during the 25 year period of my dataset, when public opinion on climate change has become so polarized. I find little support for this notion in the data. Figure 6 shows the two-sided Kullback-Leibler divergence between matching and talking-past distributions of frames over the study period.



**Figure 6: Matching versus talking past in climate change framing. Kullback-Liebler divergence is a logarithmic ratio. Values near zero suggest more matching, values farther from zero suggest more talking past.**

Overall, the data appear not to support the hypothesis that talking past in media discourse has driven the increase in political polarization on climate change at the elite and public levels. The data show an insignificant ( $p = 0.138$ ) trend toward increased matching between environment-economy frames between 1988 and 2012. This result suggests that the *New York Times*, and the mainstream newsmedia by proxy, have not increased their reporting of talking past frames over the study period as would be expected given media agenda setting and widespread public polarization on climate change. Instead, the distribution over time of arguments for and against governmental action on climate change do not seem to correlate with the increase in political polarization on the issue.

I should note that this pattern is not likely the result of a sparseness of arguments for or against action. As an additional robustness check, I used a bootstrapping procedure to resample the data 100,000 times with replacement in order to test the relationship between the p-values and the number of observations in the sample. This model showed a downward trending but extremely small relationship between the p-values and  $n$ , suggesting that there is not much power to be gained from merely increasing the sample size. More information on this robustness check can be found in Appendix B.

When estimating the one-sided model from each direction, I find further evidence that talking past has not increased over time. These model specifications provide an estimate of how the distribution of frames from a single side (e.g., just anti-action frames) differs from the other, using the other side as a reference. Substantively, a significant positive coefficient shows that the side under examination diverges from the other side over time. In other words, that side increases in talking past relative to the reference side. For example, in a one-sided model comparing anti-action frames with pro-action frames serving as the reference, a significant positive coefficient would show that skeptics' arguments have increasingly diverged from those of climate advocates. A significant negative coefficient indicates increased matching between the side of interest and the reference side.

When estimating divergence from pro-action frames to anti-action frames – that is, how much pro-action frames diverge from anti-action frames over time – the coefficient is slightly negative and statistically insignificant ( $\beta = -0.03, p = 0.28$ ). This indicates that talking past has not noticeably changed over time for this direction, but it seems unlikely that it has increased over the 25-years period given the negative coefficient. For the other side, however, I find that anti-action frames have significantly increased in matching with pro-action frames ( $\beta = -0.02, p = 0.03$ ). This is an interesting and unexpected result; given that anti-action forces stand to gain politically from a lack of action and given the assumption that more talking past would stymie such action, it would be expected that anti-action frames should do anything but match pro-action frames and invite negotiation. However, this dynamic is not observed in the newsmedia data.

### **3.4 Implications**

I find no evidence of an increased talking past pattern of framing over the years studied, meaning that the public discourse on climate change (as captured by the mainstream newsmedia) has not followed the divergent framing pattern suggested by Hoffman's polarization hypothesis. However, the observed lack of divergent framing does not mean that communication on climate change has not polarized over time. Similarly, these results do not necessarily mean that political conflict on climate change has decreased over this 25-year period. Even a cursory glance at American politics

leading up to the 2016 national elections suggests that conflict – and polarization on the issue – is as present as ever, if not increasing. For instance, every major Republican presidential candidate for 2016 has publicly disavowed governmental action on climate change with some, including frontrunners Donald Trump and Ted Cruz, denying that climate change even exists (Merchant 2015). However, rather than confirm the talking past hypothesis of polarization, the data show that talking past has not increased in newsmedia coverage of climate change from 1988-2012. Instead, the results simply suggest that any such polarization or conflict in public discourse is not associated with the proposed talking past mechanism.

Changes to my coding scheme may have produced different findings, though it is unclear in what direction. For instance, the question of whether climate change is real and/or anthropogenic in nature has long been a facet of American climate politics, however it is unknown if skeptic and advocate framing on this dimension has converged into a matching pattern, diverged into talking past, or held steady over time. The inclusion of these frames may nevertheless have affected my findings of insignificant changes in talking past over time. For instance, if anti-action frames more generally (i.e., beyond just anti-action environment-economy frames) have increased with arguments questioning scientific consensus on climate change while pro-action frames have ignored this dimension of the issue, I might have found greater indication of talking past in the historical record. Alternately, if both sets of frames have held

steady with how they represent the scientific aspects of climate change, an overall insignificant trend or a matching trend may have been found.

Similar to the caveat in Chapter 2, this chapter can make little distinction on if the frames and patterns of frame coverage analyzed speak to an indexing or gatekeeping model of journalism. Each model would point towards different conclusions. If indexing is correct, then the results suggest that political elites have not increased in their talking past on climate change, perhaps a normatively cheery notion that elites are capable or willing to negotiate on the issue. If the newsmedia are gatekeepers, then the null result in this chapter might suggest that the newsmedia are attempting to moderate the public discourse on climate change so as to foster positive discussion on the issue and prevent the fragmented communication of a talking past pattern. It is still possible that talking past has driven political polarization on American climate change politics if this radicalization has occurred on the fringes of political discourse rather than in the mainstream media discourse on which this study focuses. For instance, Hamilton (2011) points to the rise of “narrowcast media” such as websites, blogs, cable news programs, and “viral” content that have driven and sustained skeptical commentary on climate change matters. Skeptical narrowcast media, he asserts, have outpaced both advocate commentary and scientific commentary that supports climate action, which exist but are dwarfed in number and impact by skeptical sources.



Interestingly, he recommends that advocates respond in kind, using active-response websites, such as Realclimate.org, to actively rebut skeptical claims in real time, suggesting that he holds a normative stance that advocates should adopt a matching style of counterframing in order to facilitate negotiation. Narrowcast media may treat climate change as a higher salience issue than mainstream media, and therefore have a tighter selection of arguments they focus on. If skeptical and advocate narrowcast media consider climate change under wholly different dimensions of the issue, this may support the talking past hypothesis of polarization. Therefore, while I find limited evidence of differential framing strategies (i.e. talking past) among skeptics and advocates of climate action in this dataset from mainstream media, the talking past signal may be stronger when examining narrowcast or partisan media over time.

These results suggest that talking past in public discourse may not be a communications effect that has caused public polarization, at least on climate change. Indeed, if Hamilton (2011) is correct and most of the polarizing communication on climate change is found in narrowcast, niche media rather than in popular newsmedia, then selective exposure may have contributed to polarization instead. Selective exposure, “the idea that people purposefully select information matching their viewpoints,” has been one of the leading explanations for how communication effects cause polarization (Stroud 2010, p. 556). However, the evidence supporting this theory has been mixed, with Prior (2013) noting that the literature is inconsistent in proving

causal effects and is possibly rife with measurement errors. For instance, Stroud (2010) reports that, while partisan selective exposure certainly seems strongly related to polarization, the causal direction of this relationship is still unclear; partisan selective exposure may cause polarization as individuals are exposed to more ideological cues, but polarization may also drive partisan selective exposure as individuals seek out sources of information that more closely align with their ideologies. Climate change therefore presents another issue arena in which to test both selective exposure and polarization effects using narrowcast as well as mainstream media sources.

### **3.5 Conclusion**

In this paper, I examine how climate change and its economic considerations have historically been communicated in American media discourse – whether through matching frames or talking past – and consider whether an increase in talking past from 1988 to 2012 is linked to political polarization on the issue in American politics. This relationship is expected given the agenda-setting power of the popular newsmedia and would be a necessary – though not sufficient – precursor to the argument that media discourse affects public polarization. A content analysis of 25 years of newspaper data provides little evidence that talking past in the media discourse is positively correlated with the political polarization of public opinion on the issue. At best, the data show a neutral trend over the 25-year period– the opposite direction of effects expected from the talking past hypothesis. As a result, I do not find support for the hypothesis that talking

past is a driver of political polarization in American climate change politics, at least not as chronicled by mainstream media sources such as the *New York Times*.

## **4. Boomerangs versus Javelins: How Polarization Constrains Communication on Climate Change**

Over the past two decades, American politics has been marked by political polarization, most visibly at the elite and media levels (see Fiorina and Abrams 2008 and Prior 2013 for reviews). While the extent to which polarization among political elites has translated into partisan schisms at the public level more generally remains unclear, environmental issues – particularly climate change – represent an issue area that has seen undeniably sharp increases in politicization and polarization. For instance, 97 percent of the scientific community agrees that global warming is occurring and is largely due to human activity (Cook et al. 2013). However, the public view is much less homogenous, with a 2015 poll conducted by the Pew Research Center revealing stark partisan and ideological differences between Democrats and Republicans on the issue. For example, there is a 39 percentage-point gap in the belief that addressing global warming should be a top priority for the federal government (Pew Research Center 2015c).

With widespread partisan antagonism surrounding the issue (see McCright and Dunlap 2011b), climate change is an excellent case through which to examine how an increasingly hostile environment for political information on an issue affects how communicators interact with public opinion. An extensive literature on political framing across a wide range of topic areas suggests that, given strong messages and credible

sources for those messages, communicators are able to influence public opinion, attitudes, and behavior (Chong and Druckman 2007).

However, the theory of motivated reasoning offers a different perspective – individuals with strong personal convictions on certain issues may preferentially filter information about that issue and even reject outright information that does not comport with their prior beliefs (Taber and Lodge 2006). Given that issue polarization is a process that depends on strong political opinions and attitudes, motivated reasoning may be potentiated in issue contexts facing fierce polarization, especially when that polarization falls along identity-based lines, as in partisanship (Druckman et al. 2013).

This study contributes to the extant literatures on public opinion, political communication, and environmental politics by exploring the limits of framing effects in light of political issue polarization and by offering a cognitive mechanism to better explain communication in these contentious situations. In this paper, I report the results of a March 2014 survey experiment designed to examine how political communication and framing effects are constrained by political polarization. Examining climate change skepticism among Republicans, I observe that respondents are not receptive to frames that support action against climate change. This result suggests that, while framing is powerful, polarization can produce stressful conditions in an issue's information environment that amplify the effects of motivated reasoning and limit the impacts of framing. Here, the presence of motivated skepticism is observed in Republican

respondents' rejections of pro-climate action framing; they become more skeptical on several attitudinal and cognitive measures after exposure to such framing. Given the increasing prominence (and polarization) of environmental issues in American and global politics, this paper indicates that navigating environmental politics may be considerably more complicated than simply finding the "right" message or the "right" messenger.

## ***4.1 Background and Theory***

### **4.1.1 Framing effects**

The literature on political communication has extensively covered the use of framing to influence public opinion on political issues. Framing – specifically, emphasis framing – refers to messages that strategically emphasize certain facets of an issue and ignore others and that may influence individual and public perceptions of that issue (Chong and Druckman 2007). Scholars have previously noted how framing can affect public opinion across many issue areas, including free speech (Nelson et al. 1997), government welfare programs (Druckman 2001), capital punishment (Dardis et al. 2008), and military intervention (Berinsky and Kinder 2006). Frames are therefore potentially powerful drivers of public opinion and have been adopted as such by policy-oriented scholars and activists.

Framing effects may be generally grouped into two different types: message effects and source effects. Message effects pertain to the content of the framing – which

elements of an issue are emphasized, de-emphasized, or made most accessible for the message receiver's consumption (Chong and Druckman 2007). For instance, research has shown that partisans are generally more receptive to messages referencing issues owned by the party they personally identify with than to opposition-owned messages (Sides 2006, Cohen 2003). Source effects relate to perceptions of the deliverer of the frame, with source credibility linked to perceived knowledgeability, trustworthiness, and whether the messenger shares similar perspectives or characteristics as the intended audience (Lupia and McCubbins 1998, Druckman and Lupia 2000, Cohen 2003).

#### **4.1.2 Motivated reasoning**

Insights from political psychology suggest that framing on polarized issues may be more difficult than simply crafting the right messages. While framing effects can be powerful, models of political cognition focusing mainly on information provision – as in many framing studies – ignore how individuals process that political information. Using Druckman's (2001) terminology, frames in thought are just as important to consider as frames in communication. For issues seen as controversial or where there is an abundance of conflicting information – as in climate change (see Crow and Boykoff 2014) – individuals tend to selectively process political cues from framing (Zaller 1992, Krosnick et al. 2006, Malka et al. 2009). Consequently, individuals may pass over information that challenges or seems incompatible with their political preferences, becoming even more confident of those preferences regardless of substantive grounding

(Druckman et al. 2013).

The theory of motivated reasoning states that individuals with strong prior attitudes and beliefs may be goal-oriented in preferentially seeking out and processing information supporting those beliefs. In addition, these motivated individuals are apt to ignore or reject disconfirming information (Kunda 1990, Kuklinski and Hurley 1994, Taber and Lodge 2006, Lodge and Taber 2013). Previously, political scientists considered individuals with strong political inclinations as 'online' processors of information. That is, these individuals engage in Bayesian updating in which new information adjusts the individual's prior attitude on some issue by strengthening or weakening it depending on the valence of the stimulus (Lodge et al. 1995).

In contrast, motivated reasoners filter information to fit their desired stance rather than allowing information to influence their position. Because motivated reasoners prefer not to change their minds about their strongly held beliefs, they approach potentially dissonant information in a fundamentally different way than confirmatory information. As a result, motivated reasoners behave contrary to traditional expectations of political behavior, particularly in how they process stimuli such as political frames.

Cognitive motivation may arise from any aspect of social identity, such as party identification (Bartels 2002, Slothuus and de Vreese 2010), political ideology (Jost et al. 2003), or race (Kuklinski and Hurley 1994). These motivations are not transitory but



become aspects of an individual's personal identity and frequently reflect that individual's social and political identity (Huddy 2001). Once set, motivations are remarkably persistent, even in the face of corrective information (Nyhan and Reifler 2010). Motivated reasoning is closely associated with an increased personal interest in politics (Taber and Lodge 2006, Lodge and Taber 2000). Motivated reasoning is also negatively associated with attitudinal ambivalence, or the lack of certainty and stability of attitudes (Lavine et al. 2012, Lodge and Taber 2000). Individuals with greater political interest better understand the political landscape, can more readily discern and process appropriate cues, and have greater knowledge with which to refute undesirable information. Individuals with lower attitudinal ambivalence (i.e., greater certainty of their attitudes) are more susceptible to motivated reasoning, and the cognitive process of counterarguing dissonant information reduces their ambivalence even further (Lodge and Taber 2000).

#### **4.1.3 Motivated skepticism**

Polarized political issues may interact with motivated reasoning at the individual level to constrain issue framing and make framing less effective. It is important to consider that when motivated reasoners are exposed to information that clashes with their identities, they engage in a motivated skepticism wherein they mentally counterargue against any stimuli that could depolarize their beliefs (Taber and Lodge 2006, Edwards and Smith 1996). Disconfirmation bias may further polarize motivated

reasoners if the process makes them more certain of the validity of their prior beliefs (Ditto and Lopez 1992, Taber and Lodge 2006). For instance, Taber and Lodge (2006) find that individuals with strong prior attitudes on gun control and affirmative action strengthen in attitude polarization following exposure to information that is incongruent with their priors and that greater political sophistication intensifies this effect. This is referred to as a “backfire” or “boomerang” effect.

## ***4.2 Theoretical Expectations***

Given these considerations, I expect motivated reasoners in a polarized context to be not merely unreceptive to political frames they disagree with but to actively counterargue and perhaps react to those frames with even more negative beliefs. Theoretically, the interaction of motivated reasoning with issue polarization is key here. Absent motivated reasoning, framing effects should hold despite the level of issue polarization, with the ‘worst’ effect being unreceptivity to frames. The boomerang effect, wherein framing backfires and intensifies prior views, should only appear when motivated skepticism is so strong that it triggers particularly fierce counterarguing.

Climate change offers an excellent issue arena in which to test how the interaction of issue polarization and motivated reasoning affects political communication; the issue is conveniently polarized along political party lines and boomerang effects have been observed in previous studies of American public opinion on climate change. For example, Hart and Nisbet (2012) find evidence of a boomerang

effect in assessing partisan differences in support of governmental climate mitigation policy when mediated by respondent social identification with the proposed victims of warming impacts. However, Hart and Nisbet only ask about support for governmental action, which may be endogenous to their partisanship measure given that Republicans generally express disdain for governmental regulation. Thus, a reduction in regulatory support may be a function of their general anti-regulatory attitudes and be unrelated to climate change. Further, they test explicitly non-political messages. In a consumer context, Gromet et al. (2013) demonstrate that conservatives are less likely to choose expensive compact fluorescent light bulbs when they are marked with a small 'Protect the Environment' sticker than when they are unmarked, but they do not offer a cognitive mechanism for this result. Though not focusing on partisanship, Kahan et al. (2010, 2012) investigate cultural polarization and observe that attitudes on climate change are much more dependent on personal identity and values than on scientific literacy.

Given that climate change attitudes appear to be sharply split along party lines, with Republicans seemingly highly skeptical of climate change as a political issue necessitating action (see McCright and Dunlap 2011b, Buell 2003), this group is appropriate for a study on whether motivated reasoning constrains framing effects.

Democrats and Democratic-leaning independents were excluded from this study for two sets of reasons. The first is theoretical. Democrats score high enough on measures of climate change concern (e.g. Pew Research Center 2015a) that exposure to

pro-action framing may not make much difference due to a ceiling effect. However, testing Democratic responses to anti-action framing may indeed induce motivated reasoning effects, although some research suggests that right-wing political ideology lends itself to motivated reasoning and is particularly resistant to change compared to left-wing ideology (Jost et al. 2003). The second is more practical. Whether exposing Democratic respondents to pro-action framing to test the effects of motivated confirmation bias or anti-action framing for effects of disconfirmation bias, their addition to the study would have necessitated a doubling of overall sample size. Unfortunately, due to budgetary limitations, these conditions could not be met for this study.

Framing (or reframing) climate change is seen by both activists and scholars as key to influencing public opinion and overcoming political deadlock (e.g., Lakoff 2010, Nisbet 2009, McElwee 2014). If framing effects are effective in this information environment, I expect that exposure to pro-climate change action framing will increase Republican support for environmental policies (Hypothesis 1a). Further, given that partisans are predisposed to favor information with cues consonant with their political identities, the most effective frames may be those that reference Republican-owned issues such as national security (Hypothesis 1b) or that are delivered by Republican sources (Hypothesis 1c).

Alternatively, if Republicans are motivated by their partisan identities to oppose

action on climate change (either governmental or personal), I should find very different effects. In particular, I expect to see signs of motivated skepticism among Republican respondents to framing in the form of backfire – subjects moving against the frame. In this case, a boomerang effect would be a post-exposure Republican becoming increasingly opposed to taking governmental action against climate change or taking commensurate personal action (Hypothesis 2a). Because the boomerang effect relies on an individual identifying and reacting against cues that are most hostile to their identity, I expect that Republicans will counterargue most harshly against frames attributed to a Democratic source and against Democrat-owned messages (Hypothesis 2b).

The mechanism of motivated reasoning can be confirmed via complementary measures, such as decreased attitudinal ambivalence post framing (Hypothesis 2c) and a positive correlation between backfire strength and political interest, a proxy for the level of motivated reasoning (Hypothesis 2d). These Hypothesis 2 statements stand in opposition to those in Hypothesis 1.

## **4.3 Methods**

### **4.3.1 Data**

The data come from a diverse national sample of registered American Republicans and Republican-leaning independents recruited by Survey Sampling International, a large professional sampling firm. The data were collected using

Qualtrics, a web-based surveying platform from February 28, 2014 to March 6, 2014 (Snow 2012). Following dataset cleaning, the sample included 476 respondents.<sup>3</sup> This sample was split across nine conditions, which provided a mean group size of 53 respondents per experimental group. The respondent age structure was sampled to be representative of American Republicans, with a median sample age of roughly 50 years. The sample was 50.7 percent male and 87.6 percent White. Balance among experimental groups on these profile variables was tested using one-way ANOVA, with no group sample being significantly skewed. The respondents that were excluded by dataset cleaning were tested for systematic differences from the remaining sample and breaking of randomization; no significant effects were found.

### **4.3.2 Design**

A multifactorial 2 x 4 (source x message) survey experiment (n = 476) was used to assess Republican reactions to message framings of climate change and attributed information sources. I evaluated nine conditions – eight treatments and one control. Participants were randomly assigned to a condition at the outset of the survey. The nine experimental conditions are presented in Table 4.

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<sup>3</sup> In cleaning the dataset, I removed all respondents reporting a political ideology of “slightly liberal,” “liberal,” or “extremely liberal” for being outside the population of interest. I also excluded 13 subjects who responded incorrectly or unacceptably on at least two of three data quality checks. These included two attention checks adapted from Clifford and Jerritt (2015) and a respondent memory check of the manipulation given (if any). Finally, I removed respondents who completed the survey in less than 1.5 minutes (16 respondents) or in over 35 minutes (8 respondents).

**Table 4: Experimental framing conditions used to test the effects of message source and message effects on Republican attitudes toward governmental and personal action on climate change.**

<i>Control</i> (no source, no message)		Message condition			
		Economic	National Security	Moral Justice	Natural Disaster
Source condition	Democrat	<i>Econ x Democrat</i>	<i>NS x Democrat</i>	<i>MJ x Democrat</i>	<i>ND x Democrat</i>
	Republican	<i>Econ x Republican</i>	<i>NS x Republican</i>	<i>MJ x Republican</i>	<i>ND x Republican</i>

Each condition exposed participants to a paragraph-long vignette embedded with message and source cues.<sup>4</sup> For each treatment vignette, participants were primed to consider the issue of climate change, introduced to a fictional political elite (identified as a former US congressman), and exposed to a series of arguments attributed to this elite calling for greater US government action against climate change. The message component included an issue linkage between climate change and another political issue, an example of projected threats from unabated climate change consistent with the issue linkage, a quote attributed to the elite, and a call to action. In an attempt to make these vignettes as realistic as possible, all statements used were originally made by a prominent political figure and are correctly attributed during the participant debriefing.<sup>5</sup>

All messages featured ‘loss frames’ (framing climate change as a reduction from the

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<sup>4</sup> See Appendix C for vignettes.

<sup>5</sup> Quotations are taken from Former Congressman Bob Inglis (Economic; Cohn 2013); Admiral Samuel J. Locklear III (National Security; Bender 2013); UN Secretary-General Ban Ki-Moon (Moral Justice; Ki-Moon 2013); Former New York City Mayor Michael Bloomberg (Natural Disaster; Hernandez 2012)

status quo, see Cobb and Kuklinski 1997, Kahneman and Tversky 1979), consistent with popular activist framings of climate change (Nisbet et al. 2013). Borrowing from Taber and Lodge (2006), I controlled for alternative explanations of cognitive bias, such as substituting argument length or complexity for argument strength, by constructing each vignette using the same five sentence format and similar levels of complexity.

The control vignette included a short neutral statement that simply prompted the respondent to consider the issue of climate change as a current political issue. The use of a neutral priming vignette in the control condition presents a more stringent test than not providing a vignette. Assuming that Republicans are nominally motivated against climate change, treatment effects should be smaller with this priming design than with no prime; if I still find significant treatment effects, those effects likely have greater external validity.

These source and message cues are intended to trigger in-group/out-group responses in Republican participants. For source cues, the vignette labels the fictional former congressman as either a Democrat or Republican. For message cues, I pretested four framings of climate change that are already prevalent in American politics, two tied to Democratic-owned issues and two referencing Republican-owned issues. On the Democratic (out-party) side, I tested messages linking climate change to *Moral Justice* and *Natural Disaster* concerns. The *Moral Justice* condition specifically invokes the themes of intergenerational equity and sustainability – the notion that future generations should



not inherit a degraded environment – and the *Natural Disaster* condition references extreme weather events, such as Hurricane Sandy in 2012. Republican conditions linked climate change to *Economic* harm – that currently favorable policies for fossil fuel companies interfere with the free market – and *National Security* threats, which invoke the specter of decreasing geopolitical stability due to the resource stresses of warming. The *Economic* frame may be particularly salient to respondents given how climate change is often discussed in American politics through environment-economy frames.

The vignettes were pretested using Amazon Mechanical Turk to ensure that they loaded onto the appropriate partisan connotations, i.e., the *Economic* and *National Security* messages are categorized as Republican and the *Moral Justice* and *Natural Disaster* framings as Democratic. The vignettes were also tested for argument strength (see Chong and Druckman's [2007] discussion of strong and weak arguments), which was measured on a one-way scale of argument effectiveness. Pre-test respondents rated all four types of issue vignettes 'somewhat effective' or better.

### **4.3.3 Variables**

The main dependent variable is an additive index of questions assessing respondent attitudes toward governmental action against climate change. This approach builds on Hart and Nisbet (2012) but focuses on respondent policy attitudes and excludes perceptions of the legitimacy of climate science. The index was formed from respondent agreement with the following battery of questions: (a) "We should

immediately increase government regulation on industries and businesses that produce a great deal of the greenhouse emissions linked to climate change”; (b) “We should immediately increase taxes on industries and businesses that produce a great deal of the greenhouse emissions linked to climate change”; and (c) “Action through the government is the best way to deal with a big issue like climate change.” Each statement was measured using a two-sided Likert-type scale with seven points ranging from “strongly agree” to “strongly disagree.” The index thus ranges from 0 (“highly opposed to governmental action against climate change”) to 18 (“highly supportive”). These three statements had a Cronbach’s  $\alpha$  of 0.9, indicating excellent internal consistency.

The second dependent variable is a measure of the likelihood of taking personal action against climate change, such as “joining an environmental organization, signing a petition, changing your consumption patterns, or changing your life habits.” This alternative measure of message effectiveness improves on Hart and Nisbet (2012) by assessing whether Republican respondents are simply more inclined to engage in personal action against climate change than to support governmental action (see Maibach et al. 2013). This item was measured on a five-point scale ranging from “not likely at all” to “extremely likely.”

I include an index of attitudinal ambivalence as a cognitive gauge of attitude strength. I follow Holbrook and Krosnick’s (2005) meta-attitudinal measure of ambivalence, which includes three questions: (a) “People’s thoughts and feelings about

an issue can be all one-sided or very mixed. How mixed are your thoughts and feelings about climate change? (b) “How much conflict do you feel about your opinions about climate change?” (c) “People can be very decisive or very indecisive in their thoughts and feelings about an issue. How indecisive are your thoughts and feelings about climate change?” These items are measured on one-way five-point scales ranging from 0 (“no ambivalence”) to 12 (“extremely high ambivalence”). Cronbach’s  $\alpha$  for this index was 0.79.

Finally, I include a five-point measure of political interest as a way of measuring motivated reasoning given that individuals with high political interest are most prone to politically motivated reasoning (Lodge and Taber 2000, Taber and Lodge 2006). I then constructed a dummy variable for “high political interest.” Responses of “extremely interested” or “very interested” are coded as 1, and lower levels of political interest are coded as 0. While interest in politics was measured post-treatment in this study, levels of political interest do not vary significantly between respondents in the control and treated conditions ( $p = 0.68$ ). Exposure to an experimental treatment does not seem to affect political interest, and the measure appears valid.

#### **4.3.4 Analysis**

In this experimental design, participants in treatment cells (such as *Economic* frame x *Democratic* source) are compared to those in the control cell. The difference in effects on the dependent variable between an experimental condition and the control

condition provides the causal effect of that framing condition (Morgan and Winship 2007). In this study, if the difference is positive, the framing was effective; if zero, the treatment was ineffective; and if negative, the treatment was ineffective and may have triggered a boomerang effect.

Causal effects between experimental conditions and control were checked using ordinary least squares linear regression of the dependent variables, such as support for or opposition to governmental action on climate change. For the independent variables, I use dummy variables for each *message x source* condition. In these models, the constant term represents the control group's results. Consequently, the regression coefficients represent the differences between respondents allocated to treatment conditions and those in the control group.

I estimate three sets of models. The first set estimates the effects of the treatments on Republican climate change attitudes, comparing each treatment condition to the control group. This is meant to gauge the framing effect of each condition and to check whether certain types of argumentation (i.e., in-group versus out-group messages, in-group versus out-group sources) are more effective than other messages. These models estimate the effects of each treatment condition on support for or opposition to governmental action, likelihood to take personal action, and attitudinal ambivalence on climate change. For the second set of models, I collapse all treatment groups to test the overall effect of exposure to framing on Republican subjects. I again estimate three

models, one for each dependent variable. I then estimate regressions stratified by the level of personal interest in politics to test for the effects of motivated reasoning on attitudes regarding climate change.

## **4.4 Results**

### **4.4.1 Initial analysis**

In my first set of models, which examines the effect of each treatment compared to the control, I find little evidence to support the framing effect hypotheses. As presented in Table 5, none of the framing conditions significantly increased Republican support for governmental action on climate change, personal likelihood to act against warming, or attitudinal ambivalence on the issue.

Rather, all framing conditions resulted in negative coefficients for all three dependent variables, meaning that every attempt at framing elicited boomerang effects. Republican respondents increased in their opposition to proposed governmental action against climate change after being exposed to framing, with three conditions eliciting statistically significant backfires: *Republican x National Security* ( $p < 0.05$ ), and *Democrat x Moral Justice* ( $p < 0.05$ ). A post-estimation Wald test confirms that these three treatment conditions are statistically different ( $p < 0.005$ ) from the other five. Republican likelihood to engage in personal action against warming also decreased following exposure to

**Table 5: Effects of treatment by framing condition.**

Condition		Governmental action		Personal action		Attitudinal ambivalence	
		All	High interest	All	High interest	All	High interest
<i>Message</i>	<i>Source</i>						
<i>Economic</i>	Republican	-1.785 (1.003)	<b>-4.104*</b> (1.659)	-0.338 (0.209)	<b>-0.965**</b> (0.36)	-0.241 (0.477)	-0.778 (0.823)
	Democrat	-0.792 (0.988)	-1.976 (1.551)	-0.057 (0.206)	-0.54 (0.337)	-0.481 (0.47)	-0.494 (0.765)
<i>National Security</i>	Republican	<b>-2.46*</b> (1.014)	<b>-3.929*</b> (1.551)	-0.38 (0.213)	<b>-1.063***</b> (0.337)	<b>-1.064*</b> (0.48)	-1.349 (0.756)
	Democrat	<b>-2.326*</b> (0.984)	<b>-4.881***</b> (1.551)	-0.266 (0.205)	<b>-1.206***</b> (0.337)	<b>-0.901†</b> (0.468)	<b>-1.873*</b> (0.756)
<i>Moral Justice</i>	Republican	-0.221 (0.979)	-0.867 (1.569)	-0.108 (0.203)	-0.444 (0.337)	-0.695 (0.462)	-1.254 (0.756)
	Democrat	<b>-2.377*</b> (0.988)	<b>-4.99***</b> (1.633)	-0.113 (0.206)	-0.66 (0.355)	<b>-1.404***</b> (0.47)	-1.327 (0.796)
<i>Natural Disaster</i>	Republican	-0.489 (0.993)	-2.292 (1.659)	-0.185 (0.207)	<b>-0.965**</b> (0.36)	-0.654 (0.47)	-0.757 (0.809)
	Democrat	-0.497 (0.971)	-2.949 (1.519)	-0.166 (0.146)	<b>-0.647*</b> (0.33)	-0.485 (0.46)	-1.053 (0.741)
Constant		8.585 (0.699)	8.167 (0.816)	2.358 (0.146)	2.778 (0.177)	3.731 (0.332)	3.444 (0.404)
n=		475	475	475	475	471	471

**Note:** Framing conditions shown in the left-hand columns. Constants represent the intercepts for control group. Unstandardized regression coefficients are shown on top. Standard errors are shown below in parentheses. The bottom three models compare all treatment groups against the control group. Governmental action is measured on a two-way scale ranging from 0 (“strongly opposed”) to 18 (“strongly support”), where 9 is neutral. The likelihood of taking personal action is measured from 1 (“not at all likely”) to 5 (“extremely likely”). Attitudinal ambivalence is measured on a one-way scale ranging from 0 (“not at all ambivalent”) to 12 (“extremely ambivalent”). \*\*\*  $p < 0.005$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , †  $p = 0.055$ .

treatment, though no single condition was statistically significant. Exposure to framing decreased respondent attitudinal ambivalence in all conditions, meaning that

Republicans felt more assured of their opposition to climate change action after being asked to consider the issue. Attitudinal ambivalence was significantly decreased for the conditions of *Republican x National Security* ( $p < 0.05$ ) and *Democrat x Moral Justice* ( $p < 0.005$ ). Among messages, the *National Security* frame seemed to provoke the greatest backfire; for instance, the coefficient for *National Security* in regards to support for governmental action ( $b = -2.4$ ) is nearly twice as large as the second-largest backfire (*Moral Justice* at  $b = -1.3$ ).

When stratifying my sample by interest in politics, I find that partisan respondents who are highly interested in politics – and thus likelier to engage in motivated reasoning – are even more skeptical of taking action against climate change post-exposure. These results, also summarized in Table 5, suggest that disconfirmation bias on the issue of climate change strengthens with political interest, providing further evidence for motivated reasoning effects given that these highly interested partisans are the most likely to engage in such cognition. Here, the most significant backfire effects (for the *Democrat x National Security* and *Democrat x Moral Justice* conditions) increase opposition to governmental action by approximately 5 points compared to the control condition ( $p < 0.01$  and  $p < 0.01$ , respectively). These boomerang effects are approximately 3 to 5 times the size of those for Republicans with low political interest.

While three framing conditions seem especially unpalatable to Republicans, none of the treatment conditions follow a clear pattern or logic. I find no statistical evidence of

systematic effects from either type of message – whether an in-party issue-linkage frame or out-party frame – or type of source. In addition, I do not find clear evidence of expectancy violation effects, i.e., Republican respondents did not punish partisan sources delivering messages at odds with what would be expected (Nelson and Garst 2005, Rahn 1993). While I find some significant differences between several treatment groups and the control group, I observe no significant differences among the treatment groups.

#### **4.4.2 Revised analysis**

Given these broad-spectrum boomerang effects, I re-estimated these models using a simple binomial variable for whether respondents were treated (coded 1) or untreated (i.e., the control condition) (coded 0). The effect of being exposed to framing on support for governmental climate change action was marginally significant ( $p = 0.073$ ) and negative ( $b = -1.34$ ) among all Republican respondents. As shown in Table 6, this opposition balloons to 3.22 points ( $p < 0.01$ ) among the highly politically interested – those partisans most prone to motivated reasoning.



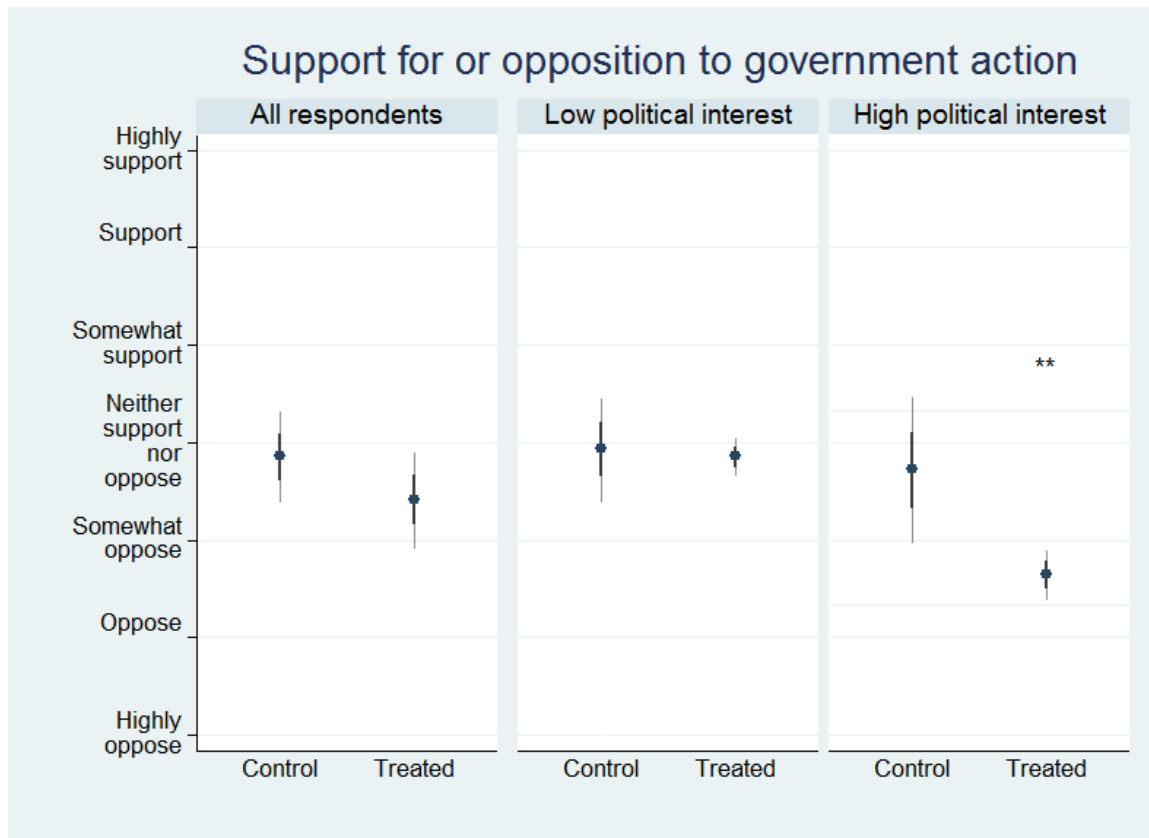
**Table 6: Effects of framing treatment stratified by personal interest in politics**

<b>Condition</b>	Governmental action	Personal action	Attitudinal ambivalence
<i>High interest in politics</i>	<b>-3.218**</b> (1.21)	<b>-0.803***</b> (0.261)	<b>-1.132†</b> (0.586)
<i>Low interest in politics</i>	-0.227 (0.873)	0.128 (0.188)	-0.494 (0.429)
n=	475	475	471

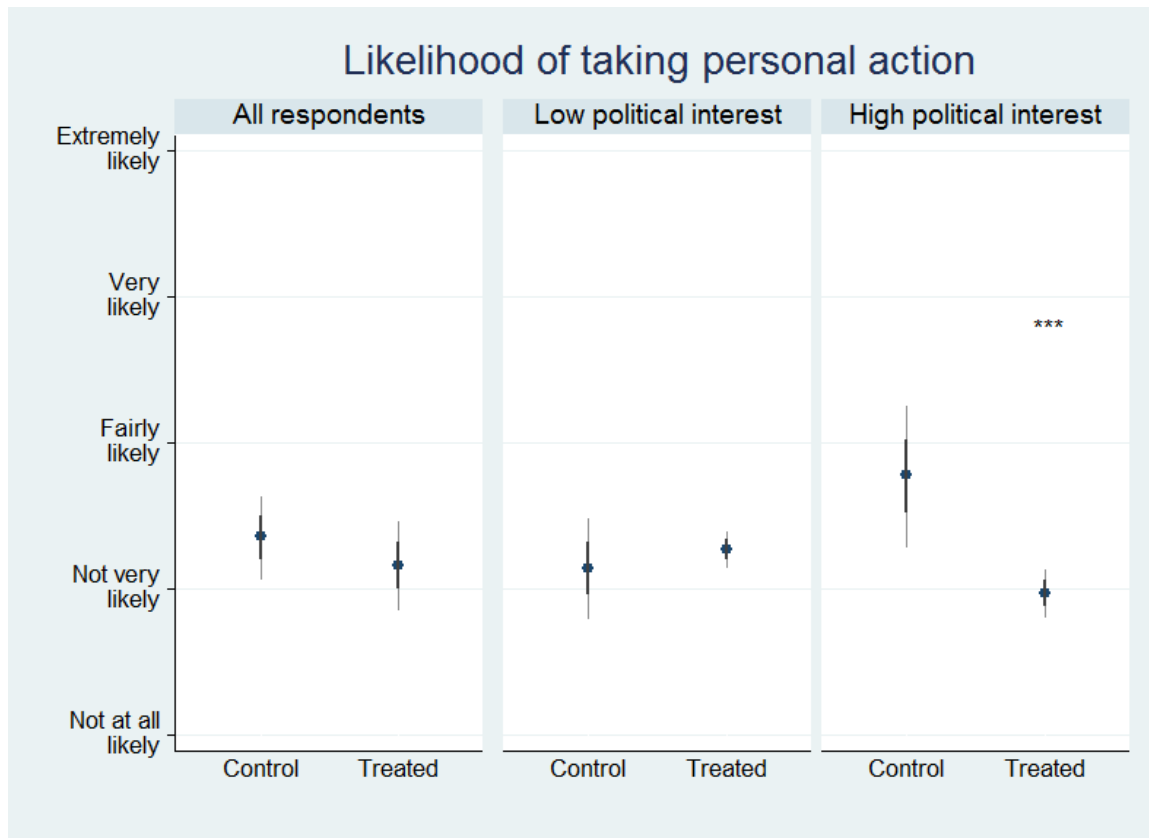
**Note:** Unstandardized regression coefficients shown on top. Standard errors are shown below in parentheses. Governmental action is measured on a two-way scale ranging from 0 (“strongly opposed”) to 18 (“strongly support”), where 9 is neutral. The likelihood of taking personal action is measured from 1 (“not at all likely”) to 5 (“extremely likely”). Attitudinal ambivalence is measured on a one-way scale ranging from 0 (“not at all ambivalent”) to 12 (“extremely ambivalent”). \*\*\*  $p < 0.005$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , † = 0.053.

This increase in skepticism is shown graphically in Figure 7. In terms of personal likelihood to act (see Figure 8), overall, treated Republicans were marginally dissuaded ( $b = -0.2$ ,  $p = 0.201$ ). However, as observed for attitudes on governmental action, politically interested partisans exhibited a significantly larger backfire effect ( $b = -0.8$ ,  $p < 0.005$ ). Similarly, in Figure 9, ambivalence decreases among treated Republicans ( $b = -0.74$ ,  $p < 0.05$ ) and even further for treated Republicans with high personal interest in politics ( $b = -1.13$ ,  $p = 0.053$ ).

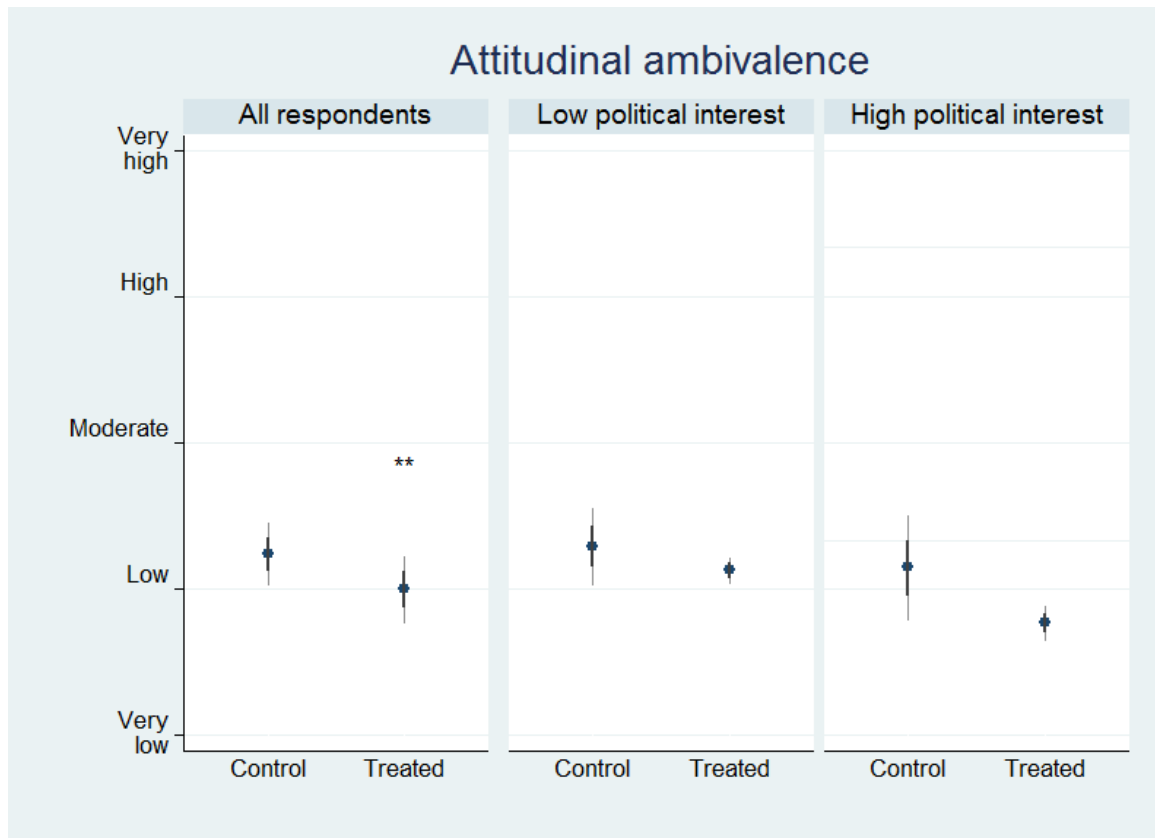
Further, these effect sizes dwarf those for Republicans who expressed low interest in politics, for whom exposure to framing was insignificantly different from the



**Figure 7: Support for or opposition to governmental action among treated respondents. Left side: effects among all respondents. Center: effects among politically uninterested. Right side: effects among politically interested. Darker lines indicate 68% confidence interval.**



**Figure 8: Likelihood of taking personal action among treated respondents. Left side: effects among all respondents. Center: effects among politically uninterested. Right side: effects among politically interested. Darker lines indicate 68% confidence interval; lighter lines indicate 95% confidence interval.**



**Figure 9: Attitudinal ambivalence among treated respondents. Left side: effects among all respondents. Center: effects among politically uninterested. Right side: effects among politically interested. Darker lines indicate 68% confidence interval; lighter lines indicate 95% confidence interval.**

control group. This suggests that polarization born of motivated reasoning is closely tied to political interest; unlike Republican respondents with high interest in politics, partisans who are politically unsophisticated do not exhibit a strong disconfirmation bias after exposure to framing. To test that the interaction between being treated and having high political interest is meaningful for this analysis, I estimated a multivariate ANOVA (MANOVA) over all three dependent variables with the two-way interaction included. This test revealed an F-statistic of 2.92 for the interaction, which was

significant at  $p < 0.05$ .

## **4.5 Discussion**

### **4.5.1 Failure of framing**

These results suggest little support for the framing despite polarization hypothesis (H1), the notion that Republican skepticism toward climate change can be mitigated by framing. Indeed, Republican respondents were unconvinced by the various messages and messengers, and these subjects rejected the information to such a degree that they increased their opposition to both proposed governmental and personal climate change action. They did so despite pre-testing suggesting that the message framing manipulations used for the treatment groups were reasonably strong and aligned with the theorized partisan values (e.g., *economic* and *national security* with the Republican Party, *moral justice* and *natural disaster* with the Democratic Party). Respondents demonstrated little to no reaction to theoretically relevant factors of message and source, seemingly treating in-party and out-party cues with equal disapproval.

These results therefore present an interesting phenomenon: known framing effects are not observed when Republicans are asked to consider a polarized issue in a light at odds with their political views. These respondents do not seem to be willing to believe the merits of such information. Rather, I find that Republicans are strongly motivated to reject information in support of climate change action on multiple metrics

of political behavior. When exposed to information advocating for increased attention to climate change, Republican respondents grew in their opposition to proposed governmental intervention. Similarly, these partisans became significantly less likely to engage in personal action. In essence, being told that climate change is a problem worth caring about – regardless of reason or source – increased Republican skepticism and decreased their support for action on the issue. These backfire effects are telltale signs of motivated counter-arguing stemming from disconfirmation biases.

As expected under the motivated reasoning hypothesis, exposure to political communication reduced partisan attitudinal ambivalence on matters of climate change. Exposure to framing not only discouraged Republicans from supporting or engaging in action against climate change but also made these partisans surer of their opposition to such action.

In addition, the observed pattern of skepticism increases with personal political interest, where Republican respondents with high levels of interest in politics become even more skeptical of climate change action than the less politically engaged. While most Republicans may not be this motivated, highly politically interested Republicans are not uncommon, representing 36.6 percent of the sample. Furthermore, even Republicans who report low interest in politics appeared unaffected by framing, showing little support for climate change action post-exposure. Given that these individuals are presumed to be unmotivated on the issue, frames contrary to their

partisan identity fail without additional backfire. This suggests that, for Republicans, climate skepticism is heavily tied to the strength of partisan identity.

#### **4.5.2 Polarization effects**

These results are neither unprecedented nor wholly unexpected. Druckman et al. (2013), in their investigation of how growing elite polarization has affected citizen policy attitudes, find that polarization encourages party-based motivated reasoning and decreases the quality of partisan opinions (by substituting party endorsements for substance), while making partisans more confident that their biased opinions are sound and well-supported. In other words, elite polarization that engenders issue polarization creates a public that is more reliant on party identification than on conscious, critical thinking for political attitude development. Furthermore, increased competition on these polarized issues cues partisans to toe the party line and invites further polarization as political identity overtakes actual consideration of issues.

Some researchers have identified possible inroads in communicating about the issue despite polarization, suggesting that would-be communicators should use more targeted or nuanced messages. For instance, Myers et al. (2012) report that individuals are more receptive to messages about climate change that use a public health frame, though their respondents are not stratified by political party identification, so it is unknown whether there were differential effects between Democrats and Republicans. Using an Australian sample, Lewandowsky et al. (2012) find that information

referencing scientific consensus is able to mitigate the effect of free-market ideology when it comes to climate change attitudes. Kahan (2010) stresses the importance of cultural values-based framing, which could affirm rather than attack skeptical values and possibly reduce the likelihood of motivated counterarguing. For instance, Kahan (2010) suggests that for people with individualistic values who distrust governmental intervention, messages that emphasize the potential for new enterprises such as geoengineering may arouse positive support for individual resourcefulness.

Patt and Weber (2013) hypothesize that the public may be more amenable to discussions about specific policy instruments than about the issue of climate change itself, and that growing familiarity with policy instruments should reduce the perceived threat of climate change action. This tactic dovetails with Fernbach et al.'s (2013) finding that polarized attitudes are moderated when individuals are asked to explain a policy in mechanistic detail; the authors theorize that this process exposes mistakes in understanding.

Another avenue would be to test different sources, both explicitly partisan and non-partisan. This study used a partisan-affiliated former Congressman as a source and found little in the way of source framing effects. Perhaps Republican respondents do not believe politicians to be credible sources on climate change. Some research suggests that Republicans may be more amenable to climate change communication from sources they politically align with, such as national security experts (Nisbet 2009, Leiserowitz



2007). However, in a study examining how various frames fare in eliciting emotions about climate change, Myers et al. (2012) found that national security frames generated low levels of hope and overwhelmingly high levels of anger among respondents skeptical of climate change. Therefore, it is possible that national security communicators could be met with similar backlash and ineffectiveness for Republicans, although those researchers did not include a messenger in their vignettes. National security communicators of climate action have also demonstrated mixed results in actual climate change communications. While the US Navy has openly supported climate action and have communicated their concern to the public and press (e.g., Casey 2015), the US Central Intelligence Agency disbanded its Center on Climate Change and National Security in 2012 after only three years of operation (Broder 2012).

Scientists also may not be the best messengers for Republicans; while overall public trust in science has stayed fairly stable since 1974, this averaged trend hides differences between liberals, moderates, and conservatives. In particular, trust in scientists among conservatives has plummeted considerably since the mid-1970s, suggesting a “long-term, group-specific decline” tied to the politicization of scientific issues and view of scientists as non-objective actors (Gauchat 2012, p. 182). Consequently, pro-action framing from scientists to Republican individuals may also elicit backfires.

While some of these approaches to bridge the partisan divide through framing

show potential, further exploration of how these prospective messages interact with partisan motivated reasoning is needed. It remains to be seen whether these approaches actually reach skeptics or merely preach to supporters. Perhaps more importantly, I would like to see more framing studies that take into account how motivated reasoning interacts with political competition – an inherent and powerful feature of the information environment surrounding polarized issues like climate change. For the most part, framing research on climate change ignores the contentiousness of and competition in political framing – positive framing effects that seem to circumvent existing partisan motivations may quickly vanish once opposing framers re-assert and re-activate those motivations (Chong and Druckman 2007). Do observed framing effects persist after subsequent waves of skeptical reinforcement, particularly for commonplace and polarizing cues, such as references to Al Gore’s documentary *An Inconvenient Truth* (on the pro-action side) or the notion that climate science is a hoax (on the anti-action side)? These relationships are still not well understood. It is also likely that certain framings may make communication even more problematic, such as using ‘global warming’ rather than ‘climate change’ (Schuldt et al. 2011). Information provision on highly polarized issues such as climate change may simply be ineffective. Given that climate skepticism has taken hold in other nations, such as Canada, Australia, and the United Kingdom (see Jacques et al. 2008), the disconfirmation and boomerang effects shown in this American sample may portend similar processes in other contexts if polarization is

left unchecked.

### **4.5.3 Implications**

The point here is not the observation that partisans who are likely to engage in motivated reasoning do engage in motivated reasoning but that issues such as climate change have become politicized and polarized enough to trigger these motivated responses regardless of the political communication strategy. Thus, the presence of these observed boomerang effects seriously hinders framing effects, as shown in the failure of the treatment manipulations to elicit the message and source effects suggested in the framing literature. Politically-minded Republicans have seemingly become so motivated to dismiss the issue of climate change that attempts to temper those predispositions will produce cognitive backlash.

While these dissuasion effects are not necessarily large in an absolute sense, it is telling that the framing cues failed so completely and unambiguously. Given that this boomerang effect can also be observed for the likelihood to take personal action against climate change, I find evidence that these negative motivations may be directed generally at the issue of climate change rather than specifically at governmental policy. After nearly two decades of intense politicization and polarization, climate change has become so unpalatable for Republicans that framing is ineffective, and quite possibly counterproductive when met by skeptical motivations.

For the most part, I focused my analysis on Republican respondents who report

high personal interest in politics and are therefore likely politically motivated. These respondents make up 37 percent of my sample – and make up roughly 34 percent of overall Republicans, according to the American National Election Studies (2013) – so only one-third of Republicans may be motivated enough to actually backfire after exposure to pro-action climate change communication. However, even for those Republicans with low political interest towards climate change, pro-action framing had negligible impacts on support for governmental action and likelihood of taking personal action (Figures 6 and 7). This suggests that Republican individuals, even those who do not feel strongly interested in politics, are not particularly receptive to pro-action framing on climate change. This lack of response may be another symptom of how little climate change matters to Republicans, and to Americans more generally (Pew Research Center 2015b); even for Republicans who may not hew to the party line on climate change, pro-action framing barely registered.

Consequently, this evidence of motivated reasoning may have some serious normative implications for American politics – and particularly climate change politics – moving forward. Given that climate change is a highly politicized and polarized issue in modern American politics, some commentators (e.g., Mann 2012) have characterized ongoing political discussions of the issue as the ‘climate wars’ or similarly strong language. Nevertheless, some framing and political communication researchers (e.g., Kahan et al. 2012, Hart and Nisbet 2012) have expressed optimism in the face of

evidence of motivated reasoning on climate change – arguing that communication across partisan, ideological, and/or cultural lines still may be possible on the issue. However, such research often seems to mischaracterize the state of American climate politics. This is not a static system in which novel information stimuli easily sway those holding skeptical attitudes. Rather, the past twenty years of intense politicization and polarization on the issue have created a formidable inertia when it comes to public opinion on matters of climate change, as evidenced by the partisan motivations found in this study and the absence of usual message and source framing effects. This inertia is then compounded by the low levels of salience for climate change among the public; the issue ranks poorly among Americans and especially so for Republicans, trailing issues like terrorism and healthcare that more easily signal crisis (Newport 2016). Consequently, it may be extremely challenging to move individuals on the issue. This chapter suggests that such political communication may be difficult, if not untenable, in polarized issue contexts. The worst-case scenario here may not simply be a lack of meaningful engagement across political lines. Rather, the lines may be so well drawn and partisans so entrenched on this issue that no amount or type of political stimulus is likely to sway Republicans to engage on climate change. Attempts to frame the issue in counter to established motivations may additionally polarize partisans further, making them even surer of their distaste for the issue. Furthermore, these boomerang effects may hold for polarized issues beyond climate change.

For practitioners of climate action, this study suggests that attempts to persuade Republican audiences via pro-action framing may be difficult, if not untenable. The issue may be so polarizing that communicating pro-action frames to Republican audiences becomes a Sisyphean task. While research suggests that framing effects strengthen with repeated exposure to an argument (Druckman 2001), the costs and energy necessary for climate advocates to mount a successful long-term Republican persuasion campaign may be resources better spent elsewhere.

If their goal is simply to accrue more individuals to their cause efficiently, climate advocates should consider looking inward rather than outward. For instance, only 69 percent of Democrats and Democratic-leaning independents consider climate change a highly important issue, compared to 82 percent for national security and 85 percent for the economy (Newport 2016). Perhaps these audiences, who would be expected to be less skeptical of climate action, could be mobilized via issue-linking messages and credible sources. Perhaps some of the remaining 31 percent of Democratic individuals, once mobilized, could even be motivated in support of climate action through effective communication, growing an “issue public” of individuals who place high personal importance on the issue (Krosnick 1990).

Although this paper focuses on the topic of climate change and is supported by one study, its implications for political communication should logically hold for other, similarly polarized issues. After all, the theorized mechanism at play concerns partisan

identity – which is as easily triggered by rhetoric about gun control or abortion as by cues on climate change. The theory may not hold for other contentious, high-profile issues that are not similarly polarized along partisan lines in the public, such as on marijuana legalization or tort reform.

It may be useful to think of political issues as existing on a polarization spectrum and that an issue's place on this spectrum constrains the role of communication and information provision. For issues with low levels of polarization, simple facts may be enough to sway undecided individuals. At moderate levels of polarization, factual information may not be enough but framing may still be effective (e.g., Nelson et al.'s [1997] experiment on framing public safety versus free speech when it comes to allowing hate groups to hold rallies). However, at high levels of issues polarization – such as with climate change – communication through information provision may be untenable, as motivated skepticism effects such as cognitive boomerangs dominate. Here, identity claims trump information.

#### **4.6 Conclusion**

Climate change is an issue that has engendered considerable political polarization over the past twenty years at both elite and public levels, making it an ideal test case for how polarization affects political communication. In examining how Republican individuals process information about climate change, I find no evidence that framing effects combat party-aligned skeptical attitudes on the issue. Rather, the

Republican participants in this experiment exhibited strong signs of motivated reasoning, rejecting attempts to have them consider the value of ameliorative action against climate change through framing. Respondents were also surer of their skeptical stances post-exposure to framing. Tellingly, these effects doubled in strength for respondents who reported high levels of personal political interest, which supports the notion that observed attitude polarization is rooted in motivated reasoning. These findings suggest that communication across the aisle on climate change may be difficult due to the history of polarization on the issue.



## **5. Closing Remarks on Climate Change Communication**

Climate change is projected to be one of the most difficult social, ecological, and economic problems of the modern era. However, despite widespread global concern, climate change is still regarded as a controversial and contentious issue within American politics. Indeed, American society is considered “poles apart” when it comes to understanding and communicating on the issue, with the gulf between climate advocates and skeptics threatening to intensify rather than diminish (Kahan 2012).

In this dissertation, I have presented three projects that examine the links among climate change, political communication, and polarization in American politics. These chapters address the following questions: 1) How has climate change been historically constructed as an issue in American politics, particularly in public discourse? 2) How have conflicts over climate change policy been historically portrayed in American public discourse? 3) How has polarization affected communication about this issue? In this concluding chapter, I review how my dissertation research answers those questions, identify theoretical and substantive implications of my work, and provide direction for future research.

### ***5.1 Constructing Climate Change***

The construction of climate change as a political issue has not been static but marked by redefinition and change. In Chapter 2, I present a historical inquiry into how climate change has been portrayed in American politics – particularly in terms of

environment-economy frames – and how popular storylines have changed over time. To do so, I created a comprehensive typology of environment-economy emphasis frames used in climate change communication, which range from arguments on the cost implications of climate action to equity concerns to industry-specific interests. I then coded 25 years of *New York Times* and catalogued climate change storylines to show how the issue has been historically constructed. I identify six major storylines from 1988 to 2012 that variously portray the issue as a cry for precautionary governance, a warning against runaway environmentalism, and a battle over the role of greenhouse gas regulation, among others. Most notably, my results show the lack of a dominant climate change storyline over the issue's first 25 years in American politics; climate change has been constructed in a variety of ways without a prevailing storyline that has definitively characterized the problem.

Instead, these six storylines fade in and out of rhetorical prominence over time, sometimes reappearing in slightly different iterations – as in the No Regrets storylines that emphasize green energy and energy efficiency – but oftentimes being replaced by new storylines more fitting to the political landscape at the time. Some prior research (e.g., Liu et al. 2009) suggests that short-term focusing events, such as natural disasters and international climate conferences, influence how climate change is covered in newsmedia. To this list of potential focusing events, I add national elections, particularly those that involve a change in party supremacy in Congress or the presidency. To

establish whether elections or other types of focusing events have a causal relationship with framing trends and storyline transition on climate change, further process-tracing analysis will be required.

## ***5.2 Polarized Politics in Climate Change Communication***

From 1988 to 2012, climate change became much more contentious and polarized in American politics. In Chapter 3, I evaluate the talking past hypothesis of polarization, which posits that political polarization on an issue develops when two rival sides fail to negotiate on that issue, instead speaking past each other about entirely different facets of the issue. I tested whether this phenomenon could be observed in 25 years of newsmedia coverage of climate change, which is a proxy for public discourse on the issue.

In a novel application of information theory methods to political science research, I show no significant increase in “talking past” between pro-action and anti-action arguments in public discourse on climate change. However, these results do not mean that conflict is nonexistent or that conflicts between climate advocates and skeptics are being meaningfully resolved. Instead, my study shows that increased talking past in public discourse may not be to blame for the observed conflict and polarization in modern American climate change politics. Although my findings are contrary to some of the literature on climate change communication, which have offered talking past as a possible explanation for the increase in public and elite polarization on climate change,

this study may be limited by its use of popular newsmedia data. The *New York Times*, while capturing mainstream public discourse, may not be the likeliest venue for polarizing communication on climate change compared to narrowcast media, such as ideologically-driven blogs and broadcast programming. These narrowcast media may promote a particular agenda – or denigrate an opponent’s – demonstrating talking past. However, it is currently unknown to what extent climate change framing in narrowcast media affects general public discourse on the issue.

### **5.3 Climate Change Communication in Polarized Politics**

As climate change has become more polarized in public opinion and elite discourse, the prospects for political communication have likewise changed. I argue that they have been constrained. In Chapter 4, I discuss an original survey experiment designed to test how partisan identity affects perceptions of climate change communication, in particular, how Republicans respond behaviorally and cognitively to a battery of pro-action framings of the issue. However, rather than react according to known framing effects, Republicans in this study rejected all eight framing conditions that advocated for climate action, becoming less supportive for governmental action against climate change, less likely to take personal action, and less attitudinally ambivalent on the issue after exposure to framing. In other words, Republican respondents exhibited cognitive backfires on two behavioral measures of climate action and simultaneously became surer of their anti-action attitudes post-framing. In addition,

these backfires double to triple in effect size for partisans with high interest in politics, indicating that identity-based motivated skepticism is likely the mechanism driving partisan responses to dissonant framing of climate change.

These results show that climate change, as a heavily polarized issue, is fraught with potential backfires of communication and that climate skepticism may now be embedded in the Republican partisan identity. While some literature still expresses hope that powerful framing levers in climate change communication may encourage skeptics to reexamine their positions, my study suggests that Republicans attitudes on the issue are quite entrenched. These results present a stark depiction of how political polarization both constrains and raises the stakes of political communication on climate change and, potentially, on other polarized issues. In particular, these results indicate that climate change communicators should be careful with their framing, lest they provoke unintended consequences. For a Republican audience, framing climate change as a societal priority may be more counterproductive for advocates than simply mentioning that climate change is an issue that exists in American politics, as in the control condition for the survey experiment.

#### ***5.4 Future Directions***

The three studies discussed in Chapters 2, 3, and 4 contribute to the study of political communication and American climate change politics. In terms of theoretical contributions, in Chapter 3, I test the talking past hypothesis of polarization and, though

the notion seems plausible, I find that evidence in mainstream public discourse on climate change does not support this hypothesis. Chapter 4 examines how polarization affects framing, finding that issues such as climate change engender partisan identity claims – and trigger motivated skepticism. Thus, it becomes extremely difficult for frames to change an individual’s entrenched prior attitudes. This study casts doubt on the supposed power of framing effects on climate change and, perhaps, on other polarized issues.

In terms of methodological innovations, Chapter 3 may be the first instance of using Kullback-Leibler divergence to model textual data for content analysis (Kullback-Leibler 1951). This model may be further applied to examine patterns of matching versus talking past in other forms of textual data, such as narrowcast media or broadcast transcripts, or to test other theories of political communication that require comparisons of distributions of data across some continuous or discrete ordered variable. In terms of substantive findings, Chapter 2 provides the first data-driven examination of how climate change has been historically constructed in American public discourse, essential knowledge if one wishes to understand how the issue has evolved over time or compare future storylines to previous storylines. Chapter 4 advances the literature on climate change politics by explicitly investigating the role of political polarization and its effects on communication, finding that climate change skepticism is sufficiently closely associated with Republican partisan identity to activate motivated skepticism responses.

Consequently, pro-action frames require communicators to tread lightly around such individuals or risk provoking further political opposition.

While the three studies in this dissertation advance our knowledge of how climate change is constructed, communicated, and understood in American politics, they also point to potential directions for future research. From Chapter 2, identifying which focusing events cause storylines to rise or fall in prominence merits further investigation. One possibility is to evaluate if – and which – focusing events cause storyline transitions by shifting the political landscape. Possibilities for independent variables might include important scientific publications, extreme weather events, or election events. Another more descriptive project, would be to continue to explore American climate change storyline development by updating the data beyond 2012. This would allow for current appraisals of how climate change is constructed, which could be valuable given the continued rapid evolution of the issue through the mid-2010s.

While the results in Chapter 3 provide an intriguing first look at the empirical data on framing and counterframing behavior in American climate change politics, some questions are left unresolved. For instance, while this paper addresses the media discourse via the proxy of mainstream American news coverage, it may be that polarized speech is more apparent on the fringes of political discourse in narrowcast media or textual sources such as Congressional speeches. The tools described in that chapter may transfer well to such an analysis. I am also intrigued by the finding that

skeptical frames have significantly trended toward matching advocate frames over the study period. Perhaps this is a product of the issue's growing saliency within the American public or the result of decreasing attention to climate skeptics in mainstream media. More investigation is needed in this area.

Finally, the study in Chapter 4 does not close the door on persuasive framing to climate skeptics. Instead, I simply caution that communication research needs to be wary of the potential for cognitive backfire and to test for such effects when evaluating framing. Given that motivated reasoning relies on personal identity defense, the key to overcoming seemingly unstoppable issue polarization may lie in targeting identity claims. As Kahan (2014) has recently noted, "communicating valid science about climate change (or about the expert consensus of climate scientists) will not dispel public conflict; only dissolving the connection between positions on the issue and membership in competing cultural groups will." However, because climate skepticism seems closely – if not inextricably – tied with partisan identity for Republican individuals, this may be a major hurdle. Nyhan and Reifler (2013, unpublished) find that affirming an individual's self-worth opens him or her up to politically uncomfortable information. In this vein, perhaps posing conciliatory statements that explicitly preserve partisan identity may lessen motivated self-defensiveness on the issue. Such proposals leave much to be explored in political communication research.

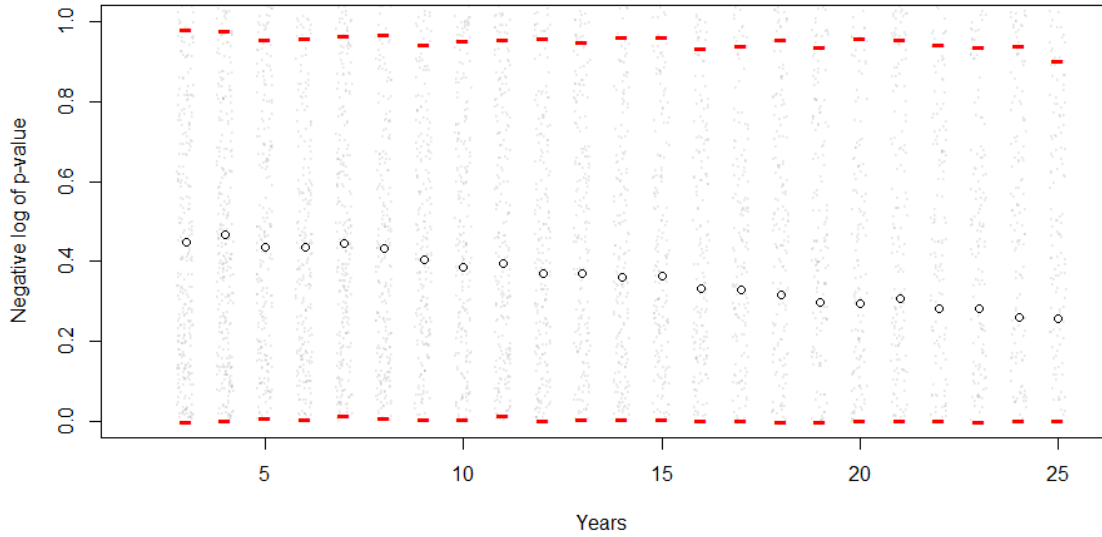


## **Appendix A: LexisNexis Search String**

((HLEAD(climate change) OR TERMS(climate change) OR TERMS(global warming) OR HLEAD(global warming)))

## Appendix B: Content Data Robustness Check

To test for statistical power in the two-sided Kullback-Liebler divergence model (Kullback and Leibler 1951), I performed a bootstrapping robustness check to resample the dataset 100,000 times with replacement to determine the relationship between sample size (shown in number of years studied) and  $p$ -value (expressed in the negative log of  $p$ ). This test (graphically shown in Figure 10) yielded a negative relationship between sample size and statistical power, as would be expected, but the coefficient is extremely small at -0.009. Consequently, it appears that simply adding more observations would not provide more explanatory power than the model currently possesses. Furthermore, given that the directions of all three divergence models were negative, one significantly so, I am confident that adding additional observations would still result in support for the null hypothesis for Chapter 3.



**Figure 10: Results of bootstrapped robustness check. Background jitter represents the 10,000 individual resamplings with replacement. Open dots are means for each year. Bottom and top hashed red lines represent the 2.5 and 97.5 quantiles for each year, respectively.**

## **Appendix C: Framing Vignettes**

### ***Economic – Democrat***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to economic development. Recently, Jay Goreham, a former Democratic Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously harm the American economy unless the US addresses the market distortions that currently restrict the free market. In particular, he mentioned how oil and other fossil fuel energy companies receive large subsidies from state and federal governments that tip the scales of the energy market in their favor, and allow them to avoid accountability for their greenhouse gas pollution. Mr. Goreham summarized his argument by saying that “we can address climate change and grow a free-enterprise economy if we fix market distortions and keep energy producers accountable for their costs to society.” In response to this problem, he called for the US government to act against climate change by reducing future economic risk. Please continue to the next page to give your thoughts on the issue.

### ***Economic – Republican***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to economic development. Recently, Jay Goreham, a former Republican Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously harm the American economy unless the US

addresses the market distortions that currently restrict the free market. In particular, he mentioned how oil and other fossil fuel energy companies receive large subsidies from state and federal governments that tip the scales of the energy market in their favor, and allow them to avoid accountability for their greenhouse gas pollution. Mr. Goreham summarized his argument by saying that “we can address climate change and grow a free-enterprise economy if we fix market distortions and keep energy producers accountable for their costs to society.” In response to this problem, he called for the US government to act against climate change by reducing future economic risk. Please continue to the next page to give your thoughts on the issue.

### ***National Security – Democrat***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to national security if untended. Recently, Jay Goreham, a former Democratic Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously endanger American national security interests as food and water shortages destabilize countries in the developing world. Specifically, he mentioned how this instability could lead to the rise of hostile regimes, the spread of dangerous weapons, and limit American access to crucial resources. Mr. Goreham summarized his argument by saying that climate change could “cripple the security environment” if not managed. In response to this problem, he called for the government to act against climate change to reduce future national security risk. Please

continue to the next page to give your thoughts on the issue.

### ***National Security – Republican***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to national security if untended. Recently, Jay Goreham, a former Republican Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously endanger American national security interests as food and water shortages destabilize countries in the developing world. Specifically, he mentioned how this instability could lead to the rise of hostile regimes, the spread of dangerous weapons, and limit American access to crucial resources. Mr. Goreham summarized his argument by saying that climate change could “cripple the security environment” if not managed. In response to this problem, he called for the government to act against climate change to reduce future national security risk. Please continue to the next page to give your thoughts on the issue.

### ***Moral Justice – Democrat***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to vulnerable populations such as the global poor. Recently, Jay Goreham, a former Democratic Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously harm the most vulnerable people around the world. In particular, he mentioned how the poor are more threatened by climate change-related events like hurricanes, drought, and food shortages due to

their lack of resources. Mr. Goreham summarized his argument by saying that “eradicating poverty and stopping climate change are mutually reinforcing goals.” In response to this problem, he has called for the US government to act against climate change to reduce the risk of the global poor. Please continue to the next page to give your thoughts on the issue.

### ***Moral Justice – Republican***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its threat to vulnerable populations such as the global poor. Recently, Jay Goreham, a former Republican Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously harm the most vulnerable people around the world. In particular, he mentioned how the poor are more threatened by climate change-related events like hurricanes, drought, and food shortages due to their lack of resources. Mr. Goreham summarized his argument by saying that “eradicating poverty and stopping climate change are mutually reinforcing goals.” In response to this problem, he has called for the US government to act against climate change to reduce the risk of the global poor. Please continue to the next page to give your thoughts on the issue.

### ***Natural Disaster – Democrat***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its connections to extreme weather events like Hurricane

Sandy. Recently, Jay Goreham, a former Democratic Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously endanger American coastal cities like New York and New Orleans as these storms become stronger and more frequent. In particular, he mentioned how damaging these storms are socially and economically, often causing billions of dollars in damage and hitting the poor hardest. Mr Goreham summarized his argument by saying that the devastation caused by extreme weather events “should be enough to compel all elected leaders to take immediate action” against climate change. In response to this problem, he has called for the US government to act against climate change to reduce the risk of more extreme weather damage. Please continue to the next page to give your thoughts on the issue.

### ***Natural Disaster – Republican***

Climate change, or global warming, has become one of the most discussed issues in American politics because of its connections to extreme weather events like Hurricane Sandy. Recently, Jay Goreham, a former Republican Party congressman, spoke out on the issue. He said that climate change, if ignored, could seriously endanger American coastal cities like New York and New Orleans as these storms become stronger and more frequent. In particular, he mentioned how damaging these storms are socially and economically, often causing billions of dollars in damage and hitting the poor hardest. Mr Goreham summarized his argument by saying that the devastation caused by extreme weather events “should be enough to compel all elected leaders to take



immediate action" against climate change. In response to this problem, he has called for the US government to act against climate change to reduce the risk of more extreme weather damage. Please continue to the next page to give your thoughts on the issue.

### ***Control***

Climate change, or global warming, has become one of the most discussed issues in American politics. Please continue to the next page to give your thoughts on the issue.

## **Appendix D: Data Archive**

Data, codebooks, and survey instrument for this dissertation are archived at:

<https://mjackzhou.github.io/dissertation.html>

## References

- Akerlof, Karen et al. 2010. "Public Perceptions of Climate Change as a Human Health Risk: Surveys of the United States, Canada and Malta." *International Journal of Environmental Research and Public Health* 7(6): 2559–2606.
- American National Election Studies. 2013. "2013 Internet Recontact Study." Stanford University and the University of Michigan.  
[http://www.electionstudies.org/study/pages/anes\\_panel\\_2013\\_inetrecontact/anes\\_panel\\_2013\\_inetrecontact.htm](http://www.electionstudies.org/study/pages/anes_panel_2013_inetrecontact/anes_panel_2013_inetrecontact.htm) (March 26, 2016).
- Antonio, Robert J., and Robert J. Brulle. 2011. "The Unbearable Lightness Of Politics: Climate Change Denial and Political Polarization." *Sociological Quarterly* 52(2): 195–202.
- Armstrong, Elizabeth M. 2003. *Conceiving Risk, Bearing Responsibility: Fetal Alcohol Syndrome & the Diagnosis of Moral Disorder*. Baltimore: Johns Hopkins University Press.
- Atkinson, Mary Layton, John Lovett, and Frank R. Baumgartner. 2014. "Measuring the Media Agenda." *Political Communication* 31(2): 355–80.
- Barzilai-Nahon, Karine. 2009. "Gatekeeping: A Critical Review." *Annual Review of Information Science and Technology* 43(1): 1–79.
- Bartels, Larry M. 2002. "Beyond the Running Tally: Partisan Bias in Political Perceptions." *Political Behavior* 24(2): 117–50.
- Baumgartner, Frank R., Suzanna L. De Boef, and Amber E. Boydston. 2008. *The Decline of the Death Penalty and the Discovery of Innocence*. New York: Cambridge University Press.
- Baumgartner, Frank R., and Bryan D. Jones. 1993. *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.
- Bazeley, Patricia, and Kristi Jackson. 2013. *Qualitative Data Analysis with NVivo*. New York: Sage Publications Limited.
- Beach, Derek, and Rasmus Brun Pedersen. 2013. *Process-Tracing Methods: Foundations and Guidelines*. Ann Arbor: University of Michigan Press.

- Bender, Bryan. 2013. "Chief of US Pacific Forces Calls Climate Biggest Worry." *Boston Globe*. <https://www.bostonglobe.com/news/nation/2013/03/09/admiral-samuel-locklear-commander-pacific-forces-warns-that-climate-change-top-threat/BHdPVCLrWEMxRe9IXJZcHL/story.html> (February 24, 2014).
- Bennett, Andrew. 2010. "Process Tracing and Causal Inference." In *Rethinking Social Inquiry: Diverse Tools, Shared Standards*, eds. Henry Brady and David Collier. Lanham: Rowman and Littlefield, 207–20.
- Bennett, W. Lance. 1990. "Toward a Theory of Press-State Relations in the United States." *Journal of Communication* 40(2): 103–27.
- Bennett, W. Lance. 2011. *News: The Politics of Illusion*. Ninth. Chicago: University Of Chicago Press.
- Berinsky, Adam J., and Donald R. Kinder. 2006. "Making Sense of Issues Through Media Frames: Understanding the Kosovo Crisis." *The Journal of Politics* 68(03): 640–56.
- Birkland, Thomas A. 1998. "Focusing Events, Mobilization, and Agenda Setting." *Journal of Public Policy* 18(1): 53–74.
- Boykoff, Maxwell T, and Jules Boykoff. 2004. "Balance as Bias: Global Warming and the US Prestige Press." *Global Environmental Change* 14(2): 125–36.
- Broder, John M. 2009. "Greenhouse Gases Imperil Health, E.P.A. Announces." *New York Times*. <http://www.nytimes.com/2009/12/08/science/earth/08epa.html> (December 25, 2015).
- Broder, John M. 2012. "C.I.A. Closes Its Climate Change Office." *New York Times*. [http://green.blogs.nytimes.com/2012/11/20/c-i-a-closes-its-climate-change-office/?\\_r=0](http://green.blogs.nytimes.com/2012/11/20/c-i-a-closes-its-climate-change-office/?_r=0) (March 27, 2016).
- Brown Jr., George E. 1997. "Environmental Science under Siege in the US Congress." *Environment* 39(2): 12–31.
- Buell, Frederick. 2003. *From Apocalypse to Way of Life: Environmental Crisis in the American Century*. New York: Routledge.
- Campbell, Angus, Philip E. Converse, Warren E. Miller, and Donald E. Stokes. 1960. *The American Voter*. Chicago: University of Chicago Press.

- Casey, Tina. 2015. "US Navy Reacts To Blockbuster Rolling Stone Climate Change Story." CleanTechnica.com. <http://cleantechnica.com/2015/02/18/us-navy-reacts-blockbuster-rolling-stone-climate-change-story/> (March 27, 2016).
- Cherry, Miriam A., and Judd F. Sneirson. 2012. "Chevron, Greenwashing, and the Myth of 'Green Oil Companies'." *Journal of Energy, Climate, and the Environment* 3: 133-154.
- Chong, Dennis, and James N. Druckman. 2007. "A Theory of Framing and Opinion Formation in Competitive Elite Environments." *Journal of Communication* 57(1): 99-118.
- Chong, Dennis, and James N. Druckman. 2012. "Counterframing Effects." *The Journal of Politics* 75(01): 1-16.
- Clifford, Scott, and Jennifer Jerit. 2015. "Do Attempts to Improve Respondent Attention Increase Social Desirability Bias?" *Public Opinion Quarterly* 79(3): 790-802.
- Cobb, Michael D., and James H. Kuklinski. 1997. "Changing Minds: Political Arguments and Political Persuasion." *American Journal of Political Science*: 88-121.
- Cobb, Roger W., and Charles D. Elder. 1983. *Participation in American Politics: The Dynamics of Agenda-Building*. 2nd ed. Baltimore: Johns Hopkins University Press.
- Cohen, Geoffrey L. 2003. "Party Over Policy: The Dominating Impact of Group Influence on Political Beliefs." *Journal of Personality and Social Psychology* 85(5): 808-22.
- Cohn, Roger. 2013. "Bob Inglis: The Republican Who Believes in Climate Change." *The Guardian*. <http://www.theguardian.com/environment/2013/feb/14/bob-inglis-republican-believes-climate-change> (February 20, 2014).
- Cook, John et al. 2013. "Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature." *Environmental Research Letters* 8(2): 1-7.
- Crow, Deserai A., and Maxwell T. Boykoff. 2014. *Culture, Politics and Climate Change: How Information Shapes Our Common Future*. New York: Routledge.
- Dardis, Frank E. et al. 2008. "Media Framing of Capital Punishment and Its Impact on Individuals' Cognitive Responses." *Mass Communication and Society* 11(2): 115-40.

- DePalma, Anthony, and Richard Perez-Pena. 2007. "Spitzer Names 2 Members of His Environmental Team." *New York Times*.  
<http://www.nytimes.com/2007/01/26/nyregion/26dec.html> (January 1, 2016).
- Ditto, Peter H., and David F. Lopez. 1992. "Motivated Skepticism: Use of Differential Decision Criteria for Preferred and Nonpreferred Conclusions." *Journal of Personality and Social Psychology* 63(4): 568-584.
- Doyle, Alister and Barbara Lewis. 2015. "With Landmark Climate Accord, World Marks Turn from Fossil Fuels." *Reuters*. <http://www.reuters.com/article/us-climatechange-summit-idUSKBN0TV04L20151212#gVKudBATCD0EGdxL.97> (February 5, 2016).
- Druckman, James N. 2001. "On the Limits of Framing Effects: Who Can Frame?" *Journal of Politics* 63(4): 1041-66.
- Druckman, James N., and Arthur Lupia. 2000. "Preference Formation." *Annual Review of Political Science* 3(1): 1-24.
- Druckman, James N., and Kjersten R. Nelson. 2003. "Framing and Deliberation: How Citizens' Conversations Limit Elite Influence." *American Journal of Political Science* 47(4): 729-45.
- Druckman, James N., Erik Peterson, and Rune Slothuus. 2013. "How Elite Partisan Polarization Affects Public Opinion Formation." *American Political Science Review* 107(01): 57-79.
- Dunlap, Riley E., and Aaron M. McCright. 2011. "Organized Climate Change Denial." In *The Oxford Handbook of Climate Change and Society*, eds. John S. Dryzek, Richard B. Norgaard, and David Schlosberg. Oxford University Press: Oxford University Press, 144-60.
- Edwards, Kari, and Edward E. Smith. 1996. "A Disconfirmation Bias in the Evaluation of Arguments." *Journal of Personality and Social Psychology* 71(1): 5-24.
- Eidelman, Scott, Christian S Crandall, and Jennifer Pattershall. 2009. "The Existence Bias." *Journal of Personality and Social Psychology* 97(5): 765-75.
- Engel, Ditlev, and Daniel M. Kammen. 2009. *Green Jobs and the Clean Energy Economy*. Copenhagen: Copenhagen Climate Council.

- Entman, Robert M. 1989. "How the Media Affect What People Think: An Information Processing Approach." *The Journal of Politics* 51(2): 347–70.
- Entman, Robert M. 2003. *Projections of Power: Framing News, Public Opinion, and U.S. Foreign Policy*. Chicago: University of Chicago Press.
- Fernbach, Philip M., Todd Rogers, Craig R. Fox, and Steven A. Sloman. 2013. "Political Extremism Is Supported by an Illusion of Understanding." *Psychological science* 24(6): 939–46.
- Festinger, Leon. 1957. *A Theory of Cognitive Dissonance*. Palo Alto: Stanford University Press.
- Fiorina, Morris P., and Samuel J. Abrams. 2008. "Political Polarization in the American Public." *Annual Review of Political Science* 11(1): 563–88.
- Galbraith, Kate. 2010. "Politics at Two Levels in Fight With the E.P.A." *New York Times*. <http://www.nytimes.com/2010/12/17/us/politics/17ttepa.html> (December 24, 2015).
- Gauchat, G. 2012. "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010." *American Sociological Review* 77(2): 167–87.
- Golan, Guy. 2006. "Inter-Media Agenda Setting And Global News Coverage." *Journalism Studies* 7(2): 323–33.
- Grimmer, J. 2010. "A Bayesian Hierarchical Topic Model for Political Texts: Measuring Expressed Agendas in Senate Press Releases." *Political Analysis* 18(1): 1–35.
- Gromet, Dena M., Howard Kunreuther, and Richard P. Larrick. 2013. "Political Ideology Affects Energy-Efficiency Attitudes and Choices." *Proceedings of the National Academy of Sciences of the United States of America* 110(23): 9314–19.
- Groseclose, Tim, and Jeffrey Milyo. 2005. "A Measure of Media Bias." *The Quarterly Journal of Economics* 120(4): 1191–1237.
- Hajer, Maarten A. 1995. *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford: Oxford University Press.
- Hallin, Daniel C. 1986. *The Uncensored War: The Media and Vietnam*. Berkeley: University of California Press.

- Hamilton, Lawrence C. 2011. "Education, Politics and Opinions about Climate Change Evidence for Interaction Effects." *Climatic Change* 104(2): 231–42.
- Hart, Philip S., and Erik C. Nisbet. 2012. "Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies." *Communication Research* 39(6): 701–23.
- Hernandez, Raymond. 2012. "Bloomberg Backs Obama, Citing Fallout From Storm." *New York Times*. <http://www.nytimes.com/2012/11/02/nyregion/bloomberg-endorse-Obama-saying-hurricane-sandy-affected-decision.html> (February 21, 2014).
- Hoffman, Andrew J. 2011. "Talking Past Each Other? Cultural Framing of Skeptical and Convinced Logics in the Climate Change Debate." *Organization & Environment* 24(1): 3–33.
- Holbrook, Allyson L., and Jon A. Krosnick. 2005. "Meta-Psychological vs. Operative Measures of Ambivalence: Differentiating the Consequences of Perceived Intra-Psychic Conflict and Real Intra-Psychic Conflict." In *Ambivalence and the Structure of Public Opinion*, eds. Stephen C. Craig and Michael D. Martinez. New York: Palgrave Macmillan, 73–104.
- Huddy, Leonie. 2001. "From Social to Political Identity: A Critical Examination of Social Identity Theory." *Political Psychology* 22(1): 127–56.
- Inhofe, James M. 2003. "The Science of Climate Change Senate Floor Statement." *Senate Committee on Environment and Public Works*. <http://www.epw.senate.gov/speechitem.cfm?party=rep&id=230594> (June 9, 2013).
- Insider Staff. 2014. "Steering the Climate Change Coverage." *New York Times*. [http://www.nytimes.com/times-insider/2014/10/27/steering-the-climate-change-coverage/?\\_r=0](http://www.nytimes.com/times-insider/2014/10/27/steering-the-climate-change-coverage/?_r=0) (January 18, 2016).
- Iyengar, Shanto, and Donald R. Kinder. 1987. *News That Matters: Agenda-Setting and Priming in a Television Age*. Chicago: University of Chicago Press.
- Jacques, Peter, Riley Dunlap, and Mark Freeman. 2008. "The Organisation of Denial: Conservative Think Tanks and Environmental Scepticism." *Environmental Politics* 17(3): 349–85.



- Jamieson, Kathleen Hall, and Paul Waldman. 2004. *The Press Effect: Politicians, Journalists, and the Stories That Shape the Political World*. New York: Oxford University Press.
- Jehl, Douglas, and Andrew C. Revkin. 2001. "Bush, in Reversal, Won't Seek Cut In Emissions of Carbon Dioxide." *New York Times*.  
<http://www.nytimes.com/2001/03/14/us/bush-in-reversal-won-t-see-cut-in-emissions-of-carbon-dioxide.html> (January 2, 2016).
- Jones, Bryan D. 1994. *Reconceiving Decision-Making in Democratic Politics: Attention, Choice, and Public Policy*. Chicago: University of Chicago Press.
- Jones, Bryan D., and Frank R. Baumgartner. 2005. *The Politics of Attention: How Government Prioritizes Problems*. Chicago: University of Chicago Press.
- Jost, John T., Jack Glaser, Arie W. Kruglanski, and Frank J. Sulloway. 2003. "Political Conservatism as Motivated Social Cognition." *Psychological Bulletin* 129(3): 339-75.
- Kahan, Dan M. 2010. "Fixing the Communications Failure." *Nature* 463(7279): 296-97.
- Kahan, Dan M. et al. 2012. "The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks." *Nature Climate Change* 2(10): 732-35.
- Kahan, Dan. 2012. "Why We Are Poles Apart on Climate Change." *Nature* 488(7411): 255.
- Kahan, Dan M., 2014. "Five Theses on Climate Science Communication (Lecture Summary & Slides)." Cultural Cognition Project.  
<http://www.culturalcognition.net/blog/2014/7/7/five-theses-on-climate-science-communication-lecture-summary.html> (July 12, 2014).
- Kahneman, D, and A Tversky. 1979. "Prospect Theory: An Analysis of Decision under Risk." *Econometrica: Journal of the Econometric Society*: 263-91.
- Kenosian, David. 2006. "Global Warming Is in Our Hands (4 Letters)." *New York Times*.  
<http://www.nytimes.com/2006/08/07/opinion/07herbert.html> (January 1, 2016).
- Ki-Moon, Ban. 2013. "UN Secretary-General Ban Ki-Moon on Intergenerational Equity." *Population and Development Review* 39(4): 727-31.
- Kingdon, John W. 1995. *Agendas, Alternatives, and Public Policies*. HarperCollins College Publishers.

- Kiousis, Spiro. 2004. "Explicating Media Salience: A Factor Analysis of New York Times Issue Coverage During the 2000 U.S. Presidential Election." *Journal of Communication* 54(1): 71–87.
- Kolbert, Elizabeth. 2006. *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. New York: Bloomsbury USA.
- Krosnick, Jon A. 1990. "Government Policy and Citizen Passion: A Study of Issue Publics in Contemporary America." *Political Behavior* 12(1): 59–92.
- Krosnick, Jon A., Allyson L. Holbrook, Laura Lowe, and Penny S. Visser. 2006. "The Origins and Consequences of Democratic Citizens' Policy Agendas: A Study of Popular Concern about Global Warming." *Climatic change* 77: 7–43.
- Krosnick, Jon A. 2015. "Fundamentals." Stanford Political Psychology Research Group. <https://pprggw.wordpress.com/fundamentals/> (February 5, 2016).
- Krugman, Paul. 2009. "An Affordable Salvation." *New York Times*. <http://www.nytimes.com/2009/05/01/opinion/01krugman.html> (January 1, 2016).
- Kuklinski, James H, and Norman L Hurley. 1994. "On Hearing and Interpreting Political Messages: A Cautionary Tale of Citizen Cue-Taking." *The Journal of Politics* 56(3): 729–51.
- Kullback, Solomon, and Richard A. Leibler. 1951. "On Information and Sufficiency." *The Annals of Mathematical Statistics* 22(1): 79–86.
- Kunda, Ziva. 1990. "The Case for Motivated Reasoning." *Psychological Bulletin* 108(3): 480–98.
- Lahsen, Myanna. 2005. "Technocracy, Democracy, and U.S. Climate Politics: The Need for Demarcations." *Science, Technology & Human Values* 30(1): 137–69.
- Lakoff, George. 2008. *The Political Mind: A Cognitive Scientist's Guide to Your Brain and Its Politics*. New York: Penguin Books.
- Lakoff, George. 2010. "Why It Matters How We Frame the Environment." *Environmental Communication: A Journal of Nature and Culture* 4(1): 70–81.
- Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge: Harvard University Press.

- Lau, Richard R., and David P. Redlawsk. 2001. "Advantages and Disadvantages of Cognitive Heuristics in Political Decision Making." *American Journal of Political Science* 45(4): 951–71.
- Lavine, Howard G., Christopher D. Johnston, and Marco R. Steenbergen. 2012. *The Ambivalent Partisan: How Critical Loyalty Promotes Democracy*. New York: Oxford University Press.
- Layzer, Judith A. 2012. *Open for Business: Conservatives' Opposition to Environmental Regulation*. Cambridge: MIT Press.
- Lecheler, Sophie, and Claes H. de Vreese. 2011. "Getting Real: The Duration of Framing Effects." *Journal of Communication* 61(5): 959–83.
- Leeper, Thomas, and Rune Slothuus. 2015, unpublished. "Can Citizens Be Framed? How Information, Not Emphasis, Changes Opinions." [http://lore.gu.se/digitalAssets/1525/1525943\\_leeper-and-slothuus---can-citizens-be-framed.pdf](http://lore.gu.se/digitalAssets/1525/1525943_leeper-and-slothuus---can-citizens-be-framed.pdf) (April 4, 2016).
- Leiserowitz, Anthony. 2007. "Communicating the Risks of Global Warming: American Risk Perceptions, Affective Images, and Interpretive Communities." In *Creating a Climate for Change*, eds. Susanne C Moser and Lisa Dilling. Cambridge University Press, 44–63.
- Lewandowsky, Stephan, Gilles E. Gignac, and Samuel Vaughan. 2012. "The Pivotal Role of Perceived Scientific Consensus in Acceptance of Science." *Nature Climate Change* 3(4): 399–404.
- Lippmann, Walter. 1922. *Public Opinion*. New York: Harcourt, Brace and Company.
- Liu, Xinsheng, Eric Lindquist, and Arnold Vedlitz. 2009. "Explaining Media and Congressional Attention to Global Climate Change, 1969-2005: An Empirical Test of Agenda-Setting Theory." *Political Research Quarterly* 64(2): 405–19.
- Lodge, Milton, Marco R. Steenbergen, and Shawn Brau. 1995. "The Responsive Voter: Campaign Information and the Dynamics of Candidate Evaluation." *American Political Science Review* 89(2): 309–26.
- Lodge, Milton, and Charles S. Taber. 2013. *The Rationalizing Voter*. New York: Cambridge University Press.

- Lodge, Milton, and Charles S. Taber. 2000. "Three Steps toward a Theory of Motivated Political Reasoning." In *Elements of Reason*, eds. Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin. Cambridge: Cambridge University Press.
- Lombard, Matthew, Jennifer Snyder-Duch, and Cheryl Campanella Bracken. 2010. "Intercoder Reliability." [matthewlombard.com](http://matthewlombard.com).  
<http://matthewlombard.com/reliability/> (April 1, 2015).
- Lupia, Arthur. 1994. "Shortcuts versus Encyclopedias: Information and Voting Behavior in California Insurance Reform Elections." *American Political Science Review* 88(1): 63–76.
- Lupia, Arthur, and Mathew D. McCubbins. 1998. *The Democratic Dilemma: Can Citizens Learn What They Need to Know?* New York: Cambridge University Press.
- Maibach, Edward W et al. 2013. *A National Survey of Republicans and Republican-Leaning Independents on Energy and Climate Change*. George Mason University Center for Climate Change Communication.  
[http://climatechangecommunication.org/sites/default/files/reports/Republicans'\\_Views\\_on\\_Climate\\_Change\\_2013.pdf](http://climatechangecommunication.org/sites/default/files/reports/Republicans'_Views_on_Climate_Change_2013.pdf). (October 20, 2014).
- Malka, Ariel, Jon A. Krosnick, and Gary Langer. 2009. "The Association of Knowledge with Concern about Global Warming: Trusted Information Sources Shape Public Thinking." *Risk analysis : an official publication of the Society for Risk Analysis* 29(5): 633–47.
- Mann, Michael E. 2013. *The Hockey Stick and the Climate Wars: Dispatches from the Front Lines*. New York: Columbia University Press.
- Marcus, George E., W. Russell Neuman, and Michael MacKuen. 2000. *Affective Intelligence and Political Judgment*. Chicago: University of Chicago Press.
- Markowitz, Ezra M., and Azim F. Shariff. 2012. "Climate Change and Moral Judgement." *Nature Climate Change* 2(4): 243–47. Martin, Shannon E., and Kathleen A. Hansen. 1998. *Newspapers of Record in a Digital Age: From Hot Type to Hot Link*. Westport, CT: Praeger.
- Margolis, Jason. 2005. "Chicago Climate Exchange paves the way for U.S. emissions trading." *Grist*. <http://grist.org/article/margolis-ccx/> (March 28, 2016).

- Martin, Shannon E., and Kathleen A. Hansen. 1998. *Newspapers of Record in a Digital Age: From Hot Type to Hot Link*. Westport, CT: Praeger.
- Mayer, Frederick W. 2014. *Narrative Politics: Stories and Collective Action*. New York: Oxford University Press.
- McCombs, Maxwell, and Amy Reynolds. 2009. "How the News Shapes Our Civic Agenda." In *Media Effects: Advances in Theory and Research*, eds. Jennings Bryant and Mary Beth Oliver. New York: Routledge, 1–16.
- McCright, Aaron M., and Riley E. Dunlap. 2010. "Anti-Reflexivity The American Conservative Movement's Success in Undermining Climate Science and Policy." *Theory, Culture & Society* 27(2-3): 100–133.
- McCright, Aaron M., and Riley E. Dunlap. 2003. "Defeating Kyoto: The Conservative Movement's Impact on U.S. Climate Change Policy." *Social Problems* 50(3): 348–73.
- McCright, Aaron M., and Riley E. Dunlap. 2011a. "Cool Dudes: The Denial of Climate Change among Conservative White Males in the United States." *Global Environmental Change* 21(4): 1163–72.
- McCright, Aaron M., and Riley E. Dunlap. 2011b. "The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010." *Sociological Quarterly* 52(2): 155–94.
- McElwee, Sean. 2014. "How to Tap Latent Conservative Support for Climate-Change Policy." *The Atlantic*.  
<http://www.theatlantic.com/politics/archive/2014/04/republicans-framing-climate-change/360911/> (June 14, 2014).
- Merchant, Emma F. 2015. "How the 2016 Presidential Candidates View Climate Change." *New Republic*. <https://newrepublic.com/article/124381/2016-presidential-candidates-view-climate-change> (December 23, 2015).
- Moons, Wesley G., Diane M. Mackie, and Teresa Garcia-Marques. 2009. "The Impact of Repetition-Induced Familiarity on Agreement with Weak and Strong Arguments." *Journal of personality and social psychology* 96(1): 32–44.
- Morgan, Stephen L, and Christopher Winship. 2007. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. New York: Cambridge University Press.

- Moser, Susanne C. 2007. "More Bad News: The Risk of Neglecting Emotional Responses to Climate Change Information." In *Creating a Climate for Change*, eds. Susanne C Moser and Lisa Dilling. Cambridge University Press, 64–80.
- Myers, Teresa A., Matthew C. Nisbet, Edward W. Maibach, and Anthony A. Leiserowitz. 2012. "A Public Health Frame Arouses Hopeful Emotions about Climate Change." *Climatic Change* 113(3-4): 1105–12.
- Nelson, Thomas E., Rosalee A. Clawson, and Zoe M. Oxley. 1997. "Media Framing of a Civil Liberties Conflict and Its Effect on Tolerance." *American Political Science Review* 91(3): 567–83.
- Nelson, Thomas E., and Zoe M. Oxley. 1999. "Issue Framing Effects on Belief Importance and Opinion." *The Journal of Politics* 61(4): 1040–67.
- New York Times*. 1990. "Some White House Effect." *New York Times*.  
<http://www.nytimes.com/1990/04/21/opinion/some-white-house-effect.html>  
 (November 21, 2012).
- New York Times* Editorial Staff. 2003. "The Energy Bill Gets Worse." *New York Times*.  
<http://www.nytimes.com/2003/09/29/opinion/the-energy-bill-gets-worse.html>  
 (November 23, 2015).
- Newport, Frank. 2016. "Democrats, Republicans Agree on Four Top Issues for Campaign." Gallup. <http://www.gallup.com/poll/188918/democrats-republicans-agree-four-top-issues-campaign.aspx> (March 26, 2016).
- Nisbet, Erik C., P. Sol Hart, Teresa Myers, and Morgan Ellithorpe. 2013. "Attitude Change in Competitive Framing Environments? Open-/Closed-Mindedness, Framing Effects, and Climate Change." *Journal of Communication* 63(4): 766–85.
- Nisbet, Matthew C. 2009. "Communicating Climate Change: Why Frames Matter for Public Engagement." *Environment* 51(2): 12-23.
- Nyhan, Brendan, and Jason Reifler. 2010. "When Corrections Fail: The Persistence of Political Misperceptions." *Political Behavior* 32(2): 303–30.
- Nyhan, Brendan, and Jason Reifler. 2013, unpublished. "Blank Slates or Closed Minds? The Role of Information Deficits and Identity Threat in The Prevalence of Misperceptions." <http://www.dartmouth.edu/~nyhan/opening-political-mind.pdf> (July 4, 2014).

- Obama, Barack. 2015. "Remarks by President Obama at the First Session of COP21." Whitehouse.gov. <https://www.whitehouse.gov/the-press-office/2015/11/30/remarks-president-obama-first-session-cop21> (January 1, 2016).
- Obani, Pedi Chiemena, and Joyeeta Gupta. 2015. "The Impact of Economic Recession on Climate Change: Eight Trends." *Climate and Development*: 1–13. Oreskes, Naomi, and Erik M. Conway. 2012. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. New York: Bloomsbury Publishing USA.
- Pakulski, Jan. 1991. *Social Movements: The Politics of Moral Protest*. Melbourne: Longman Cheshire.
- Passell, Peter. 1990. "Economic Scene; Cleaner Air, Cooler Air." *New York Times*. <http://www.nytimes.com/1990/10/03/business/economic-scene-cleaner-air-cooler-air.html> (November 23, 2015).
- Passell, Peter. 1991. "Economic Scene; The 'No Regrets' Greenhouse Fix." *New York Times*. <http://www.nytimes.com/1991/04/24/business/economic-scene-the-no-regrets-> (October 31, 2015).
- Patt, Anthony G., and Elke U. Weber. 2013. "Perceptions and Communication Strategies for the Many Uncertainties Relevant for Climate Policy." *Wiley Interdisciplinary Reviews: Climate Change*: 219–32.
- Pew Research Center. 2015a. "Ideological divide over global warming as wide as ever." <http://www.pewresearch.org/fact-tank/2015/06/16/ideological-divide-over-global-warming-as-wide-as-ever/> (March 26, 2016)
- Pew Research Center. 2015b. "Public's Policy Priorities Reflect Changing Conditions at Home and Abroad." <http://www.people-press.org/2015/01/15/publics-policy-priorities-reflect-changing-conditions-at-home-and-abroad/> (March 26, 2016). Pew Research Center. 2015c. "How Americans view the top energy and environmental issues." <http://www.pewresearch.org/key-data-points/environment-energy-2/> (March 30, 2015).
- Pooley, Eric. 2010. *The Climate War: True Believers, Power Brokers, and the Fight to Save the Earth*. New York: Hyperion.

- Pralle, Sarah B. 2003. "Venue Shopping, Political Strategy, and Policy Change: The Internationalization of Canadian Forest Advocacy." *Journal of Public Policy* 23(3): 233–60.
- Price, Vincent, and David Tewksbury. 1997. "News Values and Public Opinion: A Theoretical Account of Media Priming and Framing Title." In *Progress in Communication Sciences. Vol. 13, Advances in Persuasion*, eds. George A. Barnett and Franklin J. Boster. Greenwich: Ablex, 173–212.
- Prior, Markus. 2013. "Media and Political Polarization." *Annual Review of Political Science* 16(1): 101–27.
- Protest, David, and Maxwell McCombs. 1991. *Agenda Setting: Readings on Media, Public Opinion, and Policymaking*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Roberts, J. Timmons, and Bradley C. Parks. 2007. *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy*. MIT Press.
- Rohlinger, Deana A. 2002. "Framing the Abortion Debate: Organizational Resources, Media Strategies, and Movement-Counter-movement Dynamics." *The Sociological Quarterly* 43(4): 479–507.
- Schaer, Philipp. 2012. "Better than Their Reputation? On the Reliability of Relevance Assessments with Students." In *Information Access Evaluation. Multilinguality, Multimodality, and Visual Analytics SE - 14*, Lecture Notes in Computer Science, eds. Tiziana Catarci et al. Berlin: Springer, 124–35.
- Scheufele, Dietram A., and David Tewksbury. 2007. "Framing, Agenda Setting, and Priming: The Evolution of Three Media Effects Models." *Journal of communication* 57(1): 9–20.
- Schuldt, Jonathon P., Sara H. Konrath, and Norbert Schwarz. 2011. "'Global Warming' or 'Climate Change'? : Whether the Planet Is Warming Depends on Question Wording." *Public Opinion Quarterly* 75(1): 115–24.
- Scollon, Ron, Suzanne B. K. Scollon, and Rodney H. Jones. 2012. *Intercultural Communication: A Discourse Approach*. Chichester: John Wiley & Sons.
- Sides, John. 2006. "The Origins of Campaign Agendas." *British Journal of Political Science* 36(03): 407–36.



- Sigelman, Lee, and Emmett H. Buell. 2004. "Avoidance or Engagement? Issue Convergence in U.S. Presidential Campaigns, 1960-2000." *American Journal of Political Science* 48(4): 650–61.
- Slothuus, Rune. 2008. "More Than Weighting Cognitive Importance: A Dual-Process Model of Issue Framing Effects." *Political Psychology* 29(1): 1–28.
- Slothuus, Rune, and Claes H. de Vreese. 2010. "Political Parties, Motivated Reasoning, and Issue Framing Effects." *The Journal of Politics* 72(03): 630–45.
- Smith, Aaron, Prasad A. Naik, and Chih-Ling Tsai. 2006. "Markov-Switching Model Selection Using Kullback-Leibler Divergence." *Journal of Econometrics* 134(2): 553–77.
- Smith, Nicholas, and Anthony Leiserowitz. 2012. "The Rise of Global Warming Skepticism: Exploring Affective Image Associations in the United States over Time." *Risk Analysis* 32(6): 1021–32.
- Snow, Jonathan. 2012. "Qualtrics Survey Software: Handbook for Research Professionals." Qualtrics Lab Inc. <http://cloudfront.qualtrics.com/q1/wp-content/uploads/2012/02/QualtricsSurveySoftware.pdf> (February 22, 2016).
- Taber, Charles S., and Milton Lodge. 2006. "Motivated Skepticism in the Evaluation of Political Beliefs." *American Journal of Political Science* 50(3): 755–69.
- Tarrow, Sidney G. 2011. *Power in Movement: Social Movements and Contentious Politics*. 3rd ed. Cambridge: Cambridge University Press.
- Tversky, Amos, and Daniel Kahneman. 1986. "Rational Choice and the Framing of Decisions." *The Journal of Business* 59(4): S251–78.
- U.S. Congress. Senate. Robert Byrd and Chuck Hagel. 1997. Byrd-Hagel Resolution. 105th Cong., 1st Sess., S. Res. 98.
- Ungar, Sheldon. 1992. "The Rise and (Relative) Decline Of Global Warming As A Social Problem." *The Sociological Quarterly* 33(4): 483–501.
- Wanta, Wayne, and Yu-Wei Hu. 1994. "Time-Lag Differences In The Agenda-Setting Process: An Examination Of Five News Media." *International Journal of Public Opinion Research* 6(3): 225–40.

- Werner, Brian A. 2014. "Framing Climate Change in Local News Before and After Hurricane Sandy [Master's Thesis]." University of Pennsylvania ScholarlyCommons.  
[http://repository.upenn.edu/cgi/viewcontent.cgi?article=1058&context=mes\\_capstones](http://repository.upenn.edu/cgi/viewcontent.cgi?article=1058&context=mes_capstones) (April 4, 2016).
- White, David Manning. 1950. "The 'Gatekeeper': A Case Study in the Selection of News." *Journalism Quarterly* 27: 383-91.
- Winter, James P., and Chaim H. Eyal. 1981. "Agenda Setting for the Civil Right Issue." *Public Opinion Quarterly* 45(3): 376.
- Wolfgang, Ben. 2015. "Republican Candidates Turn Climate Change into Debate on Economy." *Washington Times*.  
<http://www.washingtontimes.com/news/2015/sep/21/republican-candidates-turn-climate-change-into-deb/?page=all> (September 22, 2015).
- Zaller, John R. 1992. *The Nature and Origins of Mass Opinion*. New York City: Cambridge University Press.

## **Biography**

Menglin “Jack” Zhou was born in Xi’an, People’s Republic of China and grew up in San Francisco, California. He received his BS with high honors in Society and Environment from the College of Natural Resources at the University of California, Berkeley. In his spare time, Jack enjoys reading novels and non-fiction literature, traveling with close friends across the United States by car, attending ultimate frisbee tournaments, sound financial planning, and listening to finely scheduled semi-annual album releases from The Wrens.